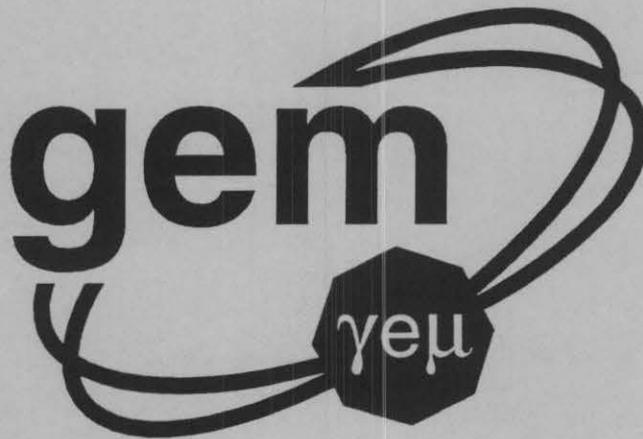


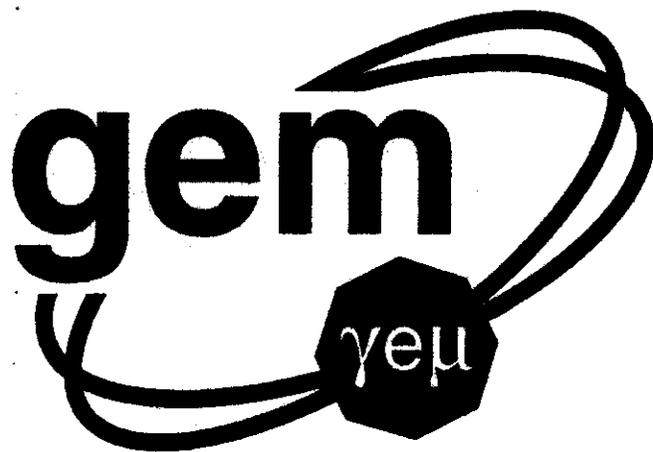
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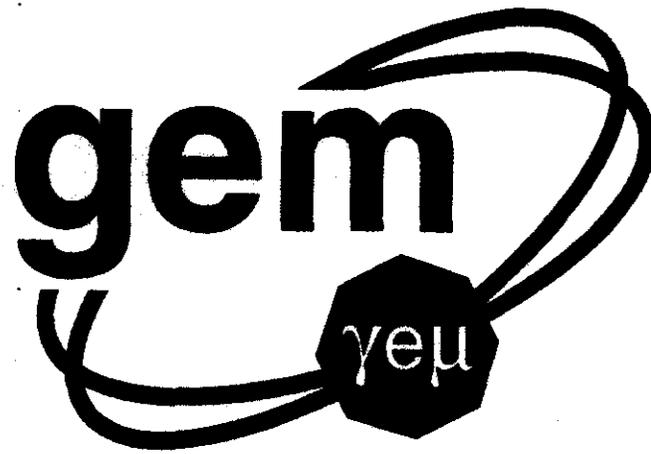
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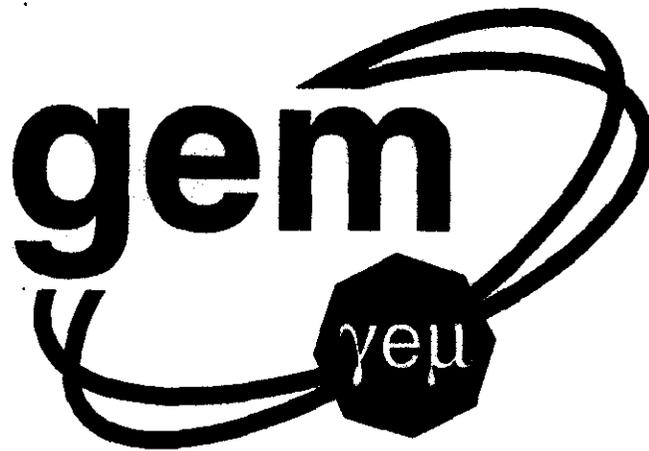
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Stefanski, R.

ACTUAL DATES -- 10/10/91 - 10/11/91

GDT-000009

Not Assigned

GDT-000010

Not Assigned

GDT-000011

Not Assigned

GDT-000012 11/08/91

GEM Muon Meeting

This document number was changed to TN-92-00050.

GDT-000013 11/20/91

GEM Engineering/Integration Meeting SSCL

Actual Dates: 11/20/91 - 11/21/91

GDT-000014 01/20/92

GEM Engineering/Integration Meeting - SSCL

Transparencies and minutes of the GEM Engineering/Integration Meeting held at the SSCL on January 20 and 21, 1992.

Actual Dates: 01/20/92-01/21/92

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

GDT-000015

03/09/92

GEM DETECTOR: Proposal for a Design Baseline

Marx, Michael

This document proposes changes to the GEM detector proposed in the LOI. These changes could become the basis for a new baseline. Also addressed are cost impacts of changes to the LOI and a list of major issues to be resolved at or following the Tuscon meeting.

Following the GEM Collaboration meeting in Tuscon, this document will be expanded to contain the controlled baseline configuration.

GDT-000016

10/10/91

Report of the Third and Final Meeting of the GEM Magnet Technical Panel

This is the third and final meeting of the GEM Magnet Technical Panel that studied issues related to the technical credibility of the GEM solenoidal magnet concept, the cost estimate, proposed schedule, and operational issues.

GDT-000017

02/18/92

GEM Engineering/Integration Meeting - SSCL

Agenda, transparencies and attenders of the GEM Integration/Engineering Meeting held at the SSCL on February 18 and 19, 1992. The following agenda items were covered: GEM User Requirements Document and Facilities Update; System Parameters and Data Base; Schedule for Next Cost Estimate Book, Detector Baseline Update and Preparation for Tuscon; and Future Work and Fund Distribution.

GDT-000018

03/25/92

Engineering/Integration Meeting - SSCL

Agenda, transparencies and attenders of the GEM Integration/Engineering Meeting held at the SSCL on March 25, 1992. The following agenda items were covered: Baseline 1 Closeout Discussions; Magnet Design Progress; Muon Design Progress; Calorimeter Design Progress; Tracker Design Progress; Schedule Update; GEFUR Progress; Latest Surface Facilities Internal Layouts; and Other Business.

GDT-000019

04/09/92

Eddy Currents in Shells of Liquid Argon Cryostat During Protective Discharge of the GEM Magnet

Martovetsky, N. N.

This memo contains results of estimation of effects regarding the eddy currents, induced in concentric shell structures in GEM detector during protective discharge, particularly in shells of vacuum vessel and cryostat with liquid Ar in hadron calorimeter. This memo gives rough evaluation of the forces, generated in shell structures carrying eddy currents and discusses heat generation in those structures during protective discharge.

Memorandum

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

GDT-000020

04/27/92

Engineering/Integration Meeting - SSCL

Agenda, attenders, minutes, and transparencies of the GEM Engineering/Integration Meeting held at the SSCL on April 27 and 28, 1992. Agenda items: General Information; Surface Facilities Update; Magnet Assembly Sequence and Facility Impact; Muon Assembly Facility; Calorimeter Assembly Sequence; Underground Facility; Schedules; Tracker Update; Calorimeter Schedule Considerations; Explained the Current GEMAG Schedule; and Water Cooling Considerations.

Actual dates April 27 & 28, 1992.

GDT-000021

06/15/92

GEM Magnet: Request for Proposal

GDT-000022

06/30/92

SSCL GEM Magnet Technical Review Meeting

Agenda and transparencies of the GEM Magnet Technical Review Meeting held at the SSC Laboratory on June 30, 1992.

GDT-000023

10/09/92

Electronic Rack Room Shielding Study

Myatt, R. L.

A revision to the size and location of the Electronic Rack Room (ERR) has resulted in this update to the previously issued shielding study. The objective of this analysis is to determine the optimal distribution of iron shielding around and within the four levels of the ERR to meet the 50 gauss design value. To this end, a number of computer runs are made with different iron plate thicknesses and location. The details and results of the analysis are summarized.

GDT-000024

10/27/92

Central Detector Support to Calorimeter Interface Control Document

Gober, Norm

This document has not been received from the author.

GDT-000025

10/27/92

Central Tracker to Calorimeter Interface Control Document

Gober, Norm

This document has not been received from the author.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

GDT-000026 10/27/92
Beam Tube to Calorimeter Interface Control Document
Gober, Norm

This document has not been received from the author.

GDT-000027 10/27/92
Muon to Calorimeter Interface Control Document
Gober, Norm

This document has not been received from the author.

GDT-000028 10/27/92
Facilities to Calorimeter Interface Control Document
Gober, Norm

This document has not been received from the author.

GDT-000029 10/27/92
Electronics to Calorimeter Interface Control Document
Gober, Norm

This document has not been received from the author.

GDT-000030 10/27/92
Internal Interface 1
Gober, Norm

This document has not been received from the author.

GDT-000031 10/27/92
Internal Interface 2
Gober, Norm

This document has not been received from the author.

GDT-000032 10/27/92
Detector Calorimeter System Development Specification
Humphreys, R.

This document has not been received from the author.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

GDT-000033 10/14/92

Engineering Meeting - SSCL

Agenda, attendees, and presentations of the GEM Engineering Meeting held at SSC Laboratory on October 14, 1992. Agenda items are: General Comments; Action Items; Muon Structures Report; Muon Chamber Status; Calorimeter; Magnet Progress; Tracker Progress; Facilities and Facilities TBD's; Schedule; Business Affairs; Safety Matters; and Other Business.

GDT-000034 10/29/92

Mini GEM Engineering Meeting

Agenda and presentations of the GEM Mini Engineering Meeting held at the Holiday Inn-DeSoto, Tx. on October 29, 1992. Agenda items are: Quadrupoles; Tracker; Calorimeter; Central Detector Support; Muon; and Beam Pipe.

GDT-000035 11/17/92

Considerations About Continuous and Discontinuous Bobbin Design for the GEM Magnet

Martovetsky, N. N.

Simple calculations regarding the additional heat generation in the bobbins during charging - slow charging.

GDT-000036 12/07/92

Joints in the Magnet - Stability, Mass Flow, Way of Cooling & Study of the Possibility to Provide Cooling to Conductor Joints from the Thermosiphon Loop in GEM Magnet

Martovetsky, N. N.

See Title

GDT-000037 11/30/92

Requirements and Specifications for the GEM Detector Magnet Conductor

Marston, P. G.
Smith, Bradford

This document has not been received from the author.

GGT-000001 02/03/92

GEM Vacuum System

Chapman, Gerry

GEM Vacuum System.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

GGT-000002

02/14/92

Users Requirements Document Preparation Memorandum

Harris, Mike

Memorandum confirming intentions to produce the GEM Users Requirements Document by March 3, 1992.

GGT-000003

02/15/88

Final Safety Analysis Report: Seismic Design, Comanche Peak Steam Electric Station

Texas Utilities Generating Company

This is the seismic design section extracted from the larger final safety analysis report for the Comanche Peak nuclear generating station located near the Superconducting Super Collider. Presented are nomograms for horizontal and vertical ground motion for a range of seismic activity parameters. These data were used for structural design of the nuclear generating station.

GGT-000004

06/17/92

Magnet Conductor Choice Memorandum

Stroynowski, Ryszard

This memorandum reviews the research conducted on the magnet conductor choice and makes a recommendation for further development of the Cable-in-Conduit design for the GEM magnet conductor.

GGT-000005 Rev. B

07/02/92

Magnet Mobility Considerations Memorandum

Harris, Mike

This memorandum discusses the problems associated with a movable magnet and possible solutions.

IN-91-00001 Rev. F

06/17/92

GEM Magnet Subsystem LOI Conceptual Design Cost Estimates

Lawrence Livermore National Laboratory

MIT-Plasma Fusion Center

Los Alamos National Laboratory

This document provides detailed information on the cost estimate of the magnet subsystem, as support to the summary information included in the LOI. It is intended that this document fully explain all assumptions made in developing the cost estimate, to facilitate reviews, as well as to form a basis for future design-to-cost efforts within the magnet subsystem.

Requires GEM Project Manager approval for distribution.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

IN-91-00002 12/15/91

Summary of the GEM Cost Estimate Status

Requires GEM Project Manager approval for distribution.

IN-92-00003 Rev. A 04/22/92

Liquid Argon Calorimeter Cost Review Meeting - SSCL

Transparencies of the presentations at the April 22, 1992 Liquid Argon Calorimeter Cost Review Meeting. Agenda items were: Resolution vs. Angle, Thickness; Status of Engineering; Cost Estimate; R&D Issues; Foreign Contribution Models; Preradiator; and Separate EM, EM+Forward.

This Document Number was changed from GEM TN-92-00090. Requires GEM Project Manager approval for distribution.

IN-92-00004 04/23/92

Electronics Cost Review

Agenda, attenders and presentations of the GEM Electronics Cost Review Meeting held at the SSC Laboratory on April 23, 1992. Agenda items included: Review of Costing Method; Costs by Subsystem; Discussion of IPC Costs; Discussion of CSC Costs; Level 2 & DAQ Costs; Plans for DAQ Design Work; Si Vtx Electronics Costs; Per-channel Cost Summaries & Discussion; and Plan for the Future.

Requires GEM Project Manager approval for distribution.

IN-92-00005 Rev. A 07/15/92

Scintillating Fiber Hadron Calorimeter Design Costing Up-Date

Boston University
Institute of Theoretical and Experimental Physics, Moscow
Oak Ridge National Laboratory

Design and cost update of the GEM Scintillating Fiber Hadron Calorimeter based on Baseline 1 parameters of the Scintillating Calorimeter option.

Requires GEM Project Manager approval for distribution.

IN-92-00006 Rev. A 07/15/92

Barium Fluoride Electromagnetic Calorimeter Design Costing Up-Date

California Institute of Technology
Oak Ridge National Laboratory
Lawrence Livermore National Laboratory

Design and cost update of the GEM Barium Fluoride Electromagnetic Calorimeter based on Baseline 1 parameters of the Scintillating Calorimeter option.

Requires GEM Project Manager approval for distribution.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

IN-92-00007

04/22/92

Tile Hadron Calorimeter Design Cost Review

Oak Ridge National Laboratory

Presentations of the Tile Hadron Calorimeter Design Cost Review. Presented at the GEM Calorimeter Cost Review Meeting held at the SSC Laboratory on April 22, 1992.

Requires GEM Project Manager approval for distribution.

IN-92-00008

04/22/92

Liquid Krypton Parallel Plate Electromagnetic Calorimeter Design Cost Review

Oak Ridge National Laboratory
University of Washington

Presentations of the GEM Liquid Krypton Parallel Plate Electromagnetic Calorimeter Design Cost Review. Presented at the GEM Calorimeter Cost Meeting held at the SSC Laboratory on April 22, 1992.

Requires GEM Project Manager approval for distribution.

IN-92-00009

05/08/92

GEM Magnet Acquisition Plan

GEM Project Department

This plan describes the procurement process for the solenoidal magnet of the GEM detector. Information is proprietary, not to be shared with industry. The plan follows the FAR requirements and describes the selection of one vendor for magnet design fabrication, assembly and installation. The plan was submitted to the DOE for approval on May 14, 1992.

Requires GEM Project Manager approval for distribution.

IN-92-00010

05/13/92

Supplemental Environmental Analysis of the GEM Magnet

Woolley, Ronn P.

The text of the environmental analysis document submitted for DOE approval on May 14, 1992.

This document has been reclassified as GEM TN-92-190. Request it as GEM TN-92-190.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

IN-92-00011

05/05/92

Muon System Cost Review

Agenda, attenders, and transparencies of the GEM Muon System Cost Review on May 5, 1992. Agenda items: Overview of Muon System; Mechanical Engineering; Support Structure; Alignment System; Installation of Chambers; Chambers Technologies; PDT; LSdT; RPC; CSC; R&D Program; and Summary/Discussion.

Requires GEM Project Manager approval for distribution.

IN-92-00012 Rev. A

06/22/92

Electronics Cost Estimate

Lau, Norman
Marlow, Daniel
Sumner, Richard

This note was prepared by the authors with the advice and support of the engineering staff of LeCroy Corporation. It represents the first stage of a process that we expect will culminate in bottom up estimates based on detailed designs.

Requires GEM Project Manager approval for distribution.

IN-92-00013 Rev. 11

06/16/92

Muon Subsystem Cost Matrix

Draper Laboratory

This Muon Cost Workbook provides the basis of estimate for each WBS element in the MUON cost estimate.

Requires GEM Project Manager approval for distribution.

IN-92-00014

06/23/92

Cost Estimate Review: Overview, Methodology, Estimate Summary

Sanders, Gary H.

Presentations by Gary Sanders at the GEM Cost Estimate Meeting held at the SSC Laboratory on June 23, 1992.

Requires GEM Project Manager approval for distribution.

IN-92-00015

06/24/92

Central Tracker Cost Estimate

A cost estimate of the GEM Central Tracker.

Requires GEM Project Manager approval for distribution.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

IN-92-00016

06/18/92

Cost Summary Roll-up 2

A summary of the GEM Cost.

Requires GEM Project Manager approval for distribution.

IN-92-00017

07/08/92

Status of Anticipated Cost Sharing by International Collaborators GEM Fiber Hadron Calorimeter

Sulak, L. R.

This document not received from the author. Requires GEM Project Manager approval for distribution.

IN-92-00018

06/01/92

GEM Magnet Subsystem Independent Estimate Evaluation

Bock, Lydia

Davison, David

Hunt, Robert

Rafuse, Harold

Trapp, Donald

SAIC - Science Applications International Corp.

U.S. Cost, Inc.

An independent evaluation of the GEM Magnet Subsystem Cost Estimate as prepared by the SSCL.

Requires GEM Project Manager approval for distribution.

IN-92-00019

07/02/92

Detector Cost Review Report

Richardson, Robert A.

The Final Report for the Cost Review on the GEM Detector held on June 23-24, 1992.

Requires GEM Project Manager approval for distribution.

IN-92-00020

07/16/92

Design Review of the GEM Magnet

Lynch, Harvey L.

Enclosed is the report of the committee on the technical review of the GEM Magnet. The charge to the committee was to review the GEM Magnet with respect to technical feasibility of its construction, cost and schedule, and the competence of the team. Because there had been a review of the costs for the entire GEM experiment the previous week and the very limited time available, there was no discussion of costs in this review.

Requires GEM Project Manager approval for distribution.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

IN-92-00021 Draft

07/30/92

Liquid Argon Calorimeter (LAC) Costs and Schedules

Barnstable, K.
Brogan, J.
Coulon, J.
Easom, B.
Mason, L.
Vinnedge, W.

This report provides detailed cost and schedule analysis for the GEM liquid argon calorimeter system based on subsystem designs developed for the TDR. Upon review of each of the calorimeter subsystem designs, materials, fabrication and assembly methods were developed into a Work Breakdown Structure (WBS) format to facilitate the collection of costs and provide resources to be scheduled. Cost estimates and schedules have been generated for procurement and labor through installation of the calorimeter in the underground hall.

Requires GEM Project Manager approval for distribution.

IN-92-00022

09/17/92

GEM Large Magnet Superconduction Subassembly Advance Acquisition Plan

This document has not been received from the author. Estimated completion date is 1/1/93. Requires GEM Project Manager approval for distribution.

IN-92-00023

10/13/92

Magnet Technical and Management Review

This document contains presentation materials from a meeting with Mr. Ed Siskin, SSCL General Manager, on October 13, 1992. This meeting reviewed highlights of the GEM magnet design, covering the following areas: conductor, cold mass, vacuum vessel, FFS, CDS, internal cryostat components, and overall on-site fabrication and assembly plan. The details of the management approach which is being used for this project were also reviewed, including the WBS, the RFP, the subsystem specification, assignment of responsibilities, etc.

PROCUREMENT SENSITIVE

Requires GEM Project Manager approval for distribution.

IN-92-00024

10/08/92

Project Control Meeting

Minutes, presentations, and list of attendees of the GEM Project Control Meeting held at the SSCL on October 8, 1992.

Requires GEM Project Manager approval for distribution.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

IN-92-00025

10/21/92

Project Control Meeting

Minutes, presentations, and list of attendees of the GEM Project Control Meeting held at the SSCL on October 21, 1992.

Requires GEM Project Manager approval for distribution.

IN-92-00026

11/11/92

Project Control Meeting

Minutes, presentations, and list of attendees of the GEM Project Control Meeting held at the SSCL on November 11, 1992.

Requires GEM Project Manager approval for distribution.

IN-92-00027

12/02/92

GEM Detector Magnet: Preliminary On-site Fabrication, Assembly, and Installation Plan

Kurchatov Institute of Atomic Energy
Lawrence Livermore National Laboratory
Los Alamos National Laboratory
MIT-Plasma Fusion Center
SSC Laboratory

This manufacturing plan presents one alternative for the process, equipment, handling fixtures and facilities that are necessary to assemble, install, commission and evaluate the GEM detector magnet at the SSCL IR5 site.

Requires GEM Project Manager approval for distribution.

IN-92-00028 Draft

12/08/92

GEM FY93 R&D/Engineering Plan

Sanders, Gary H.

The FY93 GEM R&D and Engineering Program are summarized in this plan, which contains funding requests/targets by subsystem, and supporting documentation and Statements of Work. It will be finalized as soon as the Physics Research Division budget is established.

Requires GEM Project Manager approval for distribution. This document has not been received from the author.

PN-91-00001

10/07/91

Jet Contributions to ET Cross Sections

Paige, Frank E.

QCD jets can contribute to missing transverse energy ET both because of neutrinos from heavy quarks and because jets are missed at large η or mismeasured. These effects are estimated using a simple model.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

PN-91-00002 10/07/91

tt Lepton Triggers

Paige, Frank E.

A threshold $p_t \geq 4$ - GeV is appropriate for studying tt events.

PN-91-00003 10/07/91

Possible $H \rightarrow W+W-$ Signal for $2m_W < m_H < 2m_Z$

Paige, Frank E.

A possible signature $H \rightarrow W+W- \rightarrow e\pm \mu \pm X$ for $2m_W < m_H < 2m_Z$ is considered.

PN-91-00004 09/13/91

Lepton Triggers at the SSC

Paige, Frank E.

The dominant sources of prompt leptons at the SSC are decays of c and b quarks in QCD jets, W decays, and top decays. It is important to be able to set the trigger thresholds low enough to be able to study physics just beyond the reach of the Tevatron.

PN-92-00005 03/06/92

$H \rightarrow \mu\mu\mu$ and $H \rightarrow \mu\mu e$ Acceptance

Paige, Frank E.

The loss of acceptance for Higgs events from a gap at $\eta = 0$ in the muon coverage is calculated.

TN-91-00001 07/08/91

Expression of Interest to Construct a Major SSC Detector

TN-91-00002 07/17/91

GEM Muon Meeting

Transparencies and contributions to the Second Muon Meeting held at the SSCL on July 17, 1991.

TN-91-00003 07/19/91

GEM Tracking Meeting SSCL

Transparencies, contributions and list of participants to the Second Tracking Meeting held at the SSCL on July 19, 1991.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-91-00004 09/04/91

GEM Computing Meeting SSCL

Agenda, minutes, and available transparencies of the meeting.

TN-91-00005 07/18/91

GEM Collaboration Council Meeting

Attendees and transparencies of the GEM Collaboration Council Meeting held at the SSCL on July 18, 1991.

TN-91-00006 10/08/91

GEM Calorimetry Meeting

Transparencies from the Calorimetry Meeting held at the SSCL on August 8 and 9, 1991.

TN-91-00007 09/05/91

Independent Cost Estimate of Spaghetti Hadron Calorimeter

Ayer, F.
Elder, C.
Sullivan, J. D.
Womble, E.

The Draper Laboratory Inc. is providing independent estimates of the costs to build a scintillating fiber Hadron calorimeter for the Gamma Ray, Electron and Muon (GEM) detector. The estimates are a result of earlier studies of the TEXAS and Empact/TEXAS calorimeters, as well as quotes from vendors, and a careful examination of the calorimeter design, fabrication, assembly and testing requirements. An attempt was made to explore design modifications and opportunities to reduce the total cost of the calorimeter. In this report, 3 alternatives were evaluated yielding costs of \$77M, \$68M and \$57M. As the cost is reduced; design, fabrication and material selections affect design complexity and implementation issues that are accounted for by different labor estimates. Contingencies of 10% on materials and 25% on other costs (since they are more difficult to estimate) have been used.

TN-91-00008 08/23/91

GEM Muon System Meeting Boston University

Transparencies from the Muon System Meeting held at Boston University on August 23, 1991.

TN-91-00009 09/05/91

GEM Calorimetry Questions and Answers

Proponents of candidate calorimetry technologies respond to questions and concerns.

GEM DOCUMENTS INDEX
Document Number Index w/Abstract

TN-91-00010 09/04/91

GEM Electronics/Trigger/DAQ Meeting at SSCL

Transparencies and contributions from the Electronics/Triggering/Data Acquisition Meeting held at the SSCL on September 4, 1991.

TN-91-00011 09/05/91

GEM Collaboration Council Meeting SSCL

Transparencies from the GEM Council Meeting at the SSCL on September 5, 1991 are presented.

TN-91-00012 09/04/91

GEM Calorimetry Meeting SSCL

Transparencies and contributions from the GEM Calorimetry Meeting held at the SSCL September 4 and 6, 1991 are presented. A separate volume, GEM TN-91-00009, "GEM Calorimetry Questions and Answers," contains proponents' responses to the questions posed by other people.

Actual Dates: 09/04/91 - 09/06/91

TN-91-00013 09/04/91

GEM Tracking Meeting SSCL

Transparencies, contributions, and a list of participants to the GEM Tracking Meeting held at the SSCL on September 4, 1991.

TN-91-00014 09/04/91

GEM Computing Meeting SSCL

Agenda, minutes, and available transparencies of the meeting.

TN-91-00015 09/12/91

Comparisons of EM Calorimetry for GEM

Baltay, Charles
Dong, D.
Manly, S.

In this note we attempt to make an electromagnetic calorimetry comparison for the process $H_0 \rightarrow \gamma\gamma$ that is independent of concerns about cuts and backgrounds.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-91-00016 10/01/91

GEM Muon Meeting SSCL

Transparencies from the GEM Muon Meeting held at the SSCL on October 1, 1991.

TN-91-00017 Rev. E Draft 5/18/92

GEM Cost Estimating Plan

Sawicki, Richard

This document describes the format and procedures to be used to develop the GEM cost estimate. This is intended to be the document which instructs the GEM "subsystem engineers" in their responsibilities for the cost estimate. The Work Breakdown Structure (WBS) is defined as the highest levels and guidelines are given for completing it at lower levels by subsystem. Then the matrix to be used for accumulating the cost estimate is explained in detail. Labor rates and the procedure for setting contingencies are then described. Finally, the overall (short!) schedule for the cost estimate effort is given.

TN-91-00018 10/01/91

GEM Calorimetry Meeting SSCL

Transparencies from the Calorimetry Meeting held at the SSC Laboratory on October 1, 1991.

TN-91-00019 09/22/91

SSC GEM Magnetic Field Safety & Health Effects

Woolley, Ronn P.

This report focuses upon the safety concerns associated with the fringe magnetic field, generated by the unshielded GEM Detector design. The report's purpose is to present the GEM Collaboration and SSC Directorial management with the regulatory requirements, and background information on human and equipment fringe field effects. Safety issues associated with the effects of the magnetic field upon personnel and equipment will be discussed, with the applicable regulatory requirements noted. The intent then is for SSC management to determine the nature and extent of application of the appropriate safeguarding, in mitigating the risk.

TN-91-00020 09/22/91

GEM Detector Cost and Design Study for Scintillating Hadron Calorimeters

Claffey, C. L.
Eberle, C. C.
Rennich, M. J.
Singhal, M. K.

Preliminary cost estimates for the GEM Scintillating Hadron Calorimeter Option are given. The overall goal of these estimates is to meet the standards established by the Theriot panel in earlier reviews. This is in order to enable the calorimeter subsystem group to make decisions as the basis of costs which will be used in the PAC review process after the submission of the GEM LOI.

GEM DOCUMENTS INDEX
Document Number Index w/Abstract

TN-91-00021 10/02/91

GEM Collaboration Council Meeting at the SSCL

Transparencies from the GEM Council Meeting at the SSCL on October 2, 1991 are presented.

TN-91-00022 10/10/91

GEM Tracking Meeting SSCL

Transparencies, contributions and list of participants to the Tracking Meeting held at the SSCL on October 10, 1991.

TN-91-00023

Measurements of Characteristics of the Precision Drift Chamber Prototype

Barabash, L. S.
Frolov, V. N.
Kazarinov, M. Yu.
Klimov, O. L.
Shabalina, E. K.

Details of the construction of a precision drift chamber prototype is described. Accurate placement of the wires are discussed.

TN-91-00024

Preformance of Straw Tubes Made by Ultrasoncially Welding Two Layers of Aluminized Mylar Producing 8 Parallel Tube 1 cm in Diameter

Muzzin, V.
Shukov, V.

Figures showing the measured performance characteristics of ultrasonically welded straw tubes are given.

TN-91-00025 10/02/91

GEM PAC Review

Transparencies from the GEM PAC Review at the SSCL on October 2, 1991 are presented.

TN-91-00026

Simulation Studies of Liquid Argon and Liquid Ekypton Electronmagnetic Calorimeter Plate Designs for the GEM SSC Detector

Shupe, Michael A.

GEM DOCUMENTS INDEX
Document Number Index w/Abstract

TN-91-00027

Ion Loading in Liquid Ionization Calorimeters

Rutherford, John P.

TN-91-00028

Forward Calorimeter Transition, Z Position and Segmentation

Forden, G. E.

TN-91-00029

Calorimeter e/h Effects on Reconstructing High Pt W/Z Hadrons

Forden, G. E.

The effect of different calorimeter intrinsic e/h values is investigated for reconstructing high Pt W/Z -- hadrons. The boson's width is found, to first order, to be independent of e/h but a systematic shift is found in the construction mass. This shift is Pt (Z0) dependent and is comparable to cone size effects.

TN-91-00030

Consideration Leading to the Choice of Open Field Magnet

Stroynowski, Ryszard

TN-91-00031

11/07/91

GEM Collaboration Council Meeting

TN-91-00032

11/30/91

Signal and Background of H->Gamma Gamma with Proposed GEM Calorimeter Systems

Zhu, Ren-yuan

This report summarizes main results of a study on signal and background for $H \rightarrow \gamma\gamma$ detection at SSC by using two precision electromagnetic calorimeter options (BaF2 and liquid argon) proposed by GEM collaboration. The consequence of thermal as well as pile-up noise in isolation cone is discussed. A brief discussion of intermediate mass Higgs detection by using associated production channel $H_{tt} \rightarrow \lambda\gamma\gamma$ is also given.

GEM DOCUMENTS INDEX
Document Number Index w/Abstract

TN-91-00033

03/28/92

Showershape and Preradiator Study for Higgs $\rightarrow \gamma + \gamma$ Background

Yamamoto, Hiroaki

In order to observe a clear signal of low mass Higgs with mass around 80 to 140 GeV, it is very important to reject fake isolated γ s. In this note, the showersshape distributions and preradiator signals in the BaF2 are studied to reduce these fake isolated γ s.

TN-91-00034

11/26/91

GEM Engineering R&D Plan FY 92 - The GEM Collaboration

TN-91-00035

11/05/91

Fringe Field Dipole-Dipole Force Interaction

Pillsbury, Jr., R. D.

TN-91-00036

11/07/91

Shielding of the Magnetic Fields from the GEM Magnet

Myatt, R. L.
Pillsbury, Jr., R. D.
Sullivan, J. D.

The shielding of the magnetic fields produced by the GEM magnet are described in the memorandum.

TN-91-00037

11/25/91

GEM Magnet Options: Preliminary Report

Becker, H.
Diatchenko, N.
Marston, P. G.
Pillsbury, Jr., R. D.
Sullivan, J. D.
Thome, R. J.

A strawman muon detector geometry is used in the evaluation of various designs for the GEM magnet. The Muon track resolution for the EOI baseline magnet (superconduction solenoid with thick iron end poles) is compared with an option with modified end poles (the LoI baseline), and with a uniform field. Design magnet options to improve muon resolution at small angles ($1.5 \leq \theta \leq 2.5$) include the replacement of the iron poles with a superconducting "bottle" solenoid and/or the addition of conical shells (wedges) of iron for field shaping. Because of concern about the far (surface) field, shielded variants which use either a superconducting outer solenoid or an iron flux return are also presented.

GEM DOCUMENTS INDEX
Document Number Index w/Abstract

TN-91-00038

12/04/91

Report on Radiation Damage in Barium Fluoride to the GEM Collaboration

Woody, Craig L.

This report attempts to summarize the current status of what is known about radiation damage in barium fluoride crystals and how it relates to a high resolution electromagnetic calorimeter at the SSC.

TN-91-00039

11/06/91

GEM Calorimeter Meeting SSCL

Agenda and transparencies contributed to the GEM Calorimeter Meeting held on November 6, 1991 at the SSCL.

TN-91-00040

11/05/91

GEM Tracking Meeting

TN-91-00041

12/12/91

Occupancy and Pileup in the GEM Detector

Rates and detector occupancies for each GEM Detector Subsystem are estimated and summarized.

TN-91-00042

12/05/91

GEM Collaboration Council Meeting

Agenda and transparencies contributed to the GEM Collaboration Council Meeting held on December 5, 1991.

TN-91-00043

12/12/91

GEM Muon Subgroup Meeting

Agenda, list of participants, and transparencies contributed to the GEM Muon Subgroup Meeting held on December 12, 1991.

TN-91-00044

12/06/91

GEM Electronics Group Meeting

Agenda, list of participants, and transparencies contributed to the GEM Electronics Group Meeting held on December 6, 1991.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-91-00045

12/04/91

GEM Calorimetry Meeting

Agenda and transparencies contributed to the GEM Calorimetry Meeting held on December 4, 1991.

TN-91-00046

11/18/91

GEM Forward Calorimeter Design Meeting

Forde, G. E.
Rutherford, John P.
Shaver, Leif
Shupe, Michael A.

Agenda, list of participants, and transparencies contributed to the Forward Calorimeter Design Meeting held at the SSCL on November 18, 1991.

TN-91-00047

12/06/91

GEM Tracking Meeting

Transparencies from the Tracking Meeting held at the SSCL on December 6, 1991. Included are gas studies results from Indiana, Silicon Tracker design assumptions from Los Alamos and simulation results from Yale and Los Alamos.

TN-92-00048 Rev. A

02/01/92

On Quality Requirements to the Barium Fluoride Crystals

Zhu, Ren-yuan

Barium fluoride (BaF₂) crystal calorimeter is one of two options being pursued by the GEM collaboration as a candidate precision electromagnetic calorimeter. This report summarizes the considerations on quality requirements to the BaF₂ crystals.

TN-92-00049

11/30/91

GEM Letter of Intent (LOI)

GEM Collaboration

TN-92-00050

11/08/91

GEM Muon Meeting

Agenda, list of participants, and transparencies contributed to the Muon Meeting held at the SSCL on November 8, 1991.

This document was originally issued as GDT-000012

GEM DOCUMENTS INDEX
Document Number Index w/Abstract

TN-92-00051

10/24/91

Missing ET Signature for Gluino Production in the GEM Detector for the SSC

Kahn, Stephen A.

The feasibility of looking for gluino pair production at the SSC with the GEM detector is examined. If the gluino mass is lighter than the quark mass, gluino production would have the largest cross section of a SUSY signature. This study compares rates for production of 300 GeV gluinos with background from QCD and Z_0 production. The background to 300 GeV gluinos from QCD is expected to be large, however with reasonable cuts a signal to noise ratio of 5 : 1 is achieved for $150 < ET < 300$ GeV.

TN-92-00052

10/25/91

Progress Report on Design and Simulation Studies for a Tungsten and Liquid Argon Forward Calorimeter for the GEM SSC Detector

Rutherford, John P.
Shupe, Michael A.

GEM is exploring the feasibility of satisfying hermeticity requirements with a relatively compact forward calorimeter quite close to the interaction region. This report explores whether the physics requirements can be met through realistic simulations.

TN-92-00053

01/23/92

GEM Tracking Meeting SSCL

Transparencies from the Tracking Meeting held at the SSCL on January 23, 1992. Included are preliminary specifications for the IPC array, cooling for the IPC's and front end electronics for the IPC. There is a silicon tracer update, simulation results from Yale and Los Alamos, and a section on integration issues.

TN-92-00054

11/14/91

GEM Central Tracker: Design Issues

Mills, Geoffrey B.

A discussion of design issues of the GEM central tracker is given. General features of the tracker performance are discussed in the context of the SSC environment at luminosities of 10^{33} cm⁻²s⁻¹ and 10^{34} cm⁻²s⁻¹.

TN-92-00055

01/23/92

GEM Collaboration Council Meeting - SSCL

Transparencies and agenda of the GEM Collaboration Council Meeting held at the SSCL on January 23, 1992.

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Document Number Index w/Abstract

TN-92-00056

01/24/92

GEM Calorimeter Meeting - SSCL

Transparencies and agenda of the GEM Calorimeter Meeting on Central Calorimeter Systems held at the SSCL on January 24, 1992.

TN-92-00057

01/22/92

GEM Calorimeter Meeting - SSCL

Transparencies and agenda of the GEM Calorimeter Meeting on Preradiator and Forward Systems held at the SSCL on January 22 and 24, 1992.

Actual Dates: 01/22/92-01/24/92

TN-92-00058

01/22/92

GEM Muon Group Meeting - SSCL

Transparencies and agenda of the GEM Muon Subgroup Meeting held at the SSCL on January 22, 1992.

TN-92-00059

01/20/92

GEM Computing/Simulation Meeting - SSCL

The Physics group's menu of physics reactions were presented, along with a list of desired single particle types for which parameterizations were desired for fast physics simulations. The subsystem simulation groups worked out sets of parameters which could be provided to the physics group. The simulation groups also gave status reports, and other issues (coding standards and methods, "GEMLIB", and PDSF upgrade) were discussed.

Actual Dates: 01/20/92 - 01/21/92

TN-92-00060

01/24/92

GEM Muon Group Meeting - SSCL

Transparencies and agenda for the GEM Muon Group Meeting on January 24, 1992 held at the SSCL.

TN-92-00061

02/06/92

GEM Muon System Meeting - Boston

Transparencies and agenda from the GEM Muon System Meeting on February 6, 1992, held in Boston.

TN-92-00062

Not Assigned

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-92-00063 Rev. A DRAFT

07/31/92

Central Tracker Technical Design Report, Volume V

Central Tracking Group

Volume V of the GEM Technical Design Report.

TN-92-00064

02/11/92

Workshop on Vibrational Control and Dynamic Alignment Issues at the SSC

Eberle, C. C.

Johnson, Coleman

Report to GEM on the Workshop on Vibrational Control and Dynamic Alignment Issues at the SSC

Actual Dates: 02/11/92 - 02/14/92

TN-92-00065

02/19/92

Physics Motivation for an Improved Tracker for GEM

Thomas, Jennifer

Wang, Ed

In order to take advantage of the "no lose" scenario [1], it is essential that GEM be able to measure the charge of electrons to better than 1 in 10(5) at 250 GeV momentum. The "no lose" scenario points out that if no Higgs is found in the SSC energy range, then the longitudinal W scattering should become strongly interacting and the cross section will be enhanced to a measurable value if unitarity is conserved. An improvement to the present GEM tracker design is suggested which enables the best possible momentum resolution to be achieved under the existing boundary conditions of volume and magnetic field.

TN-92-00066

02/01/92

Previous Analysis of Tracks Data in Solenoid

Yatsunenko, Yu. A.

Without tracking; determination and separation of primary vertices; preparation of arrays for reconstruction of single track; division of the tracks data onto kinematical subregions; determination of jets.

The day in the date field is not the correct date. Only February 92 was indicated on the cover.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-92-00067

02/20/92

Jet-Energy Measurements with a Noncompensating Calorimeter System

Paar, Hans Peter
Wigmans, Richard

We study how to obtain a measurement of a jet's energy with a calorimeter that consists of a noncompensating electromagnetic and a compensating or noncompensating hadronic section. We present results obtained with a simple algorithm that gets a best estimate of the true jet energy from the measured signals in each of the two calorimeter sections. The algorithm takes account of the event-to-event fluctuations in the energy deposits in the two calorimeter sections. If the hadronic calorimeter is compensating, all input data required for the method can be measured in beamtests of prototype calorimeter modules, using single electron and pion beams, and multiparticle beams (obtained from a target in a single pion beam). If the hadron calorimeter is noncompensating, additional knowledge is required regarding the jet fragmentation function and the electromagnetic energy fraction in hadronic shower development at SSC/LHC energies. The method works best for high jet energies (e.g. beyond 100 GeV) and its applicability can be extended to lower energies if the electromagnetic calorimeter is made thinner (in terms of nuclear interaction lengths). However, the noncompensating nature of the calorimeter system as a whole introduces nonlinearities in the signals, which cause a systematic uncertainty in the jet energy at the level of at least a few percent. Also, measurements of the (missing) transverse energy in SSC events are unlikely to benefit at all from this weighting procedure.

TN-92-00068 Rev. A

03/10/92

How Thick Should the GEM Barrel Calorimeter Be?

McNeil, R. R.

A simulated study of particles exiting the calorimeter from ordinary two jet events for the GEM detector at the SSC is reported. The overall rate of particles exiting the hadron filter as well as the source of these particles are determined for a constant thickness calorimeter following the GEM baseline tracking volume. Criteria are defined by which the thickness of the calorimeter can be gauged and the minimum thickness determined. From these criteria it is determined that for the rapidity range $0.0 < |\eta| < 1.3$ that 12λ of calorimeter are needed.

TN-92-00069

03/10/92

Muon Energy Loss in GEM BaF2/Scintillating Fiber Calorimeter

McNeil, R. R.

A GEANT simulation study of energy losses for energetic muons passing through the GEM BaF2 EM calorimeter + scintillating fiber hadron calorimeter is reported. Two choices for the absorber, lead and copper, are considered for the hadron section of the calorimeter. The energy loss distribution is parameterized and a subroutine described for fast simulation of muon energy loss in GEM.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-92-00070

03/16/92

Effects of Limited Calorimeter Coverage on ET

Paige, Frank E.
Vanyashin, A. V.

Due to a limited calorimeter acceptance QCD jets produced at large η will miss the calorimeter, contributing to the measured ET cross-section. A simple calorimeter model is used to estimate this effect.

TN-92-00071

03/01/92

Comparison of Three - and Four - Point Momentum Measurement in a Uniform Magnetic Field

McFarlane, Kenneth

When multiple scattering is considered, the classical 1:2:1 distribution of measurements is not necessarily optimum for measuring momentum in a uniform magnetic field. This note discusses 1:1:1 distribution with the spacing of the two middle measurements as a parameter. Such a four-point measurement can give better momentum resolution at low momentum (e.g., below 200 GeV/c) and may have advantages for pattern recognition.

TN-92-00072

03/01/92

Drift Gas Studies for GEM Muon System

Ahlen, Steven
Marin, Alex
Zhou, Bing

Using a specially designed test drift chamber, we present preliminary studies using several gas mixtures which are candidates for the GEM PDT muon system. Drift velocities and Lorentz angles were measured at various magnetic and electric fields intensities.

TN-92-00073

03/01/92

Basic Information Relating to Use of PDT's: Specification for Wire/Wall a-Concentricity

Ahlen, Steven
Marin, Alex
Zhou, Bing

The use of cylindrical drift tubes without support bridges for the wire is discussed. Basic formulae for calculating the electric field and the induced tracking errors for this configuration are presented.

GEM DOCUMENTS INDEX
Document Number Index w/Abstract

TN-92-00074

03/01/92

Wire Positioning Accuracy Based on Knowledge of Wire Tension

Ahlen, Steven
Marin, Alex
Zhou, Bing

The wire tension test setup is presented. The sagita-tension relation is presented both calculated and measured, with and without the presence of the electric field.

TN-92-00075

03/01/92

Measurements of HRS Wire Tensions 12 Years After Construction

Ahlen, Steven
Marin, Alex
Zhou, Bing

The technique used to build PDTs for the HRS experiment is described. Wire tensions were measured after 12 years indicating good stability over long periods of time.

TN-92-00076 Rev. C

07/09/92

GEM Baseline 1 Specification

Barish, Barry
Harris, Mike
Marx, Michael
Sanders, Gary H.
Willis, William

This document details the current GEM detector baseline design. This design will be used for an in-depth analysis of cost, schedule and physics performance.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-92-00077

03/01/92

Radiation Damage in Large Barium Fluoride Crystals

Li, P. J.
Xie, Y. Y.
Zhao, Y. L.
Yin, Z. W.

The radiation damage of barium fluoride (BaF₂) crystals was investigated through the changes in their optical transmission before and after γ -ray irradiation. The correlation of radiation damage with crystal growth conditions revealed that the radiation damage is impurity and defect related. As impurity is concerned, when the contents of cationic impurities decrease to a certain tolerated level, oxygen and hydroxyl become most harmful. High density of defect such as scattering centers in crystal also resulted in radiation damage. Thanks to recent progress in BaF₂ crystal growth, an encouraging result of radiation test on large crystals has been achieved. On the mechanism of radiation damage, it is likely that the oxygen ion came from dissolved oxygen during irradiation is the cause of 190-250 nm absorption band and the formation of F color center is the origin of 500-600 nm absorption band. Another hypothesis by L.Y. Chen *et al.* suggests that the formation of U center after irradiation is responsible for the VUV absorption at 204 nm and IR absorption at 793.75 cm⁻¹ respectively.

TN-92-00078

03/01/92

Radiation Damage of Rare Earth Ions Doped Barium Fluoride Crystals

Chen, G.
Man, S. Q.
Ren, S. X.
Xiao, H.
Zhang, J. Q.

The radiation resistance of rare earth doped barium fluoride (BaF₂) crystals was investigated. Stable trivalence elements, such as Y, La and Lu, have no effect on radiation resistance. While the elements which changes its valence from +3 to +4 under irradiation, such as Ce and Pr, are harmful to the radiation resistance of BaF₂, the elements which changes its valence from +3 to +2 under irradiation, such as Sm, Eu, Dy, and Yb, are useful in eliminating color centers in visible range, but may introduce some additional color center in UV range.

TN-92-00079

12/05/91

Intermediate Mass Higgs \rightarrow WW Decay

Yamamoto, Hiroaki

The Higgs decay mode, $H \rightarrow W+W^-$, is very important in the Higgs mass range above the $W+W^-$ threshold and below the Z^0Z^0 threshold. In this note, the leptonic decays of this process $H \rightarrow W+W^- \rightarrow e+m^-$, has been studied for various top mass, and it is shown that the background against this signal can be reduced to the same size as the signal and that we can expect to have statistically significant signal.

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Document Number Index w/Abstract

TN-92-00080

03/08/92

GEM Muon Group Meeting - Tucson

Agenda, attenders, and transparencies of the GEM Muon group meeting held at Tucson on March 8, 1992. Agenda: (1) Review of the new baseline; (2) Status of the trigger; (3) Status of engineering design; (4) R&D short term goals and schedule; (5) cost review preparation; and (6) Long range plans - EDR and beyond.

TN-92-00081

03/31/92

Jazelle Data Manager for GEM, The

Johnson, A. S.

The Jazelle data management package has been developed over the proceeding seven years, initially for the SLD experiment at SLAC. The system was designed as a successor to earlier systems such as Bos and Zebra and includes many improvements over these systems such as self-documenting data structures, mnemonic access to all data, relational data structures, powerful machine-independent IO facilities and many mechanisms for presenting data to the physicist in an intuitive manner. This paper presents a brief and informal introduction to the JAZELLE data management system and highlights some of the ways in which its use could prove beneficial to the GEM Collaboration.

TN-92-00082

04/01/92

GEM Magnet Subsystem Industrial Subcontract Information Meeting

Agenda and transparencies of the GEM Magnet Subsystem Industrial Subcontract Information Meeting held at the SSC Laboratory on April 1, 1992.

TN-92-00083

03/08/92

GEM Trigger/DAQ Group Meeting

Attenders and transparencies of the GEM Trigger/DAQ Group Meeting held at the Collaboration Meetings in Tucson on March 8 and 10, 1992.

TN-92-00084

03/08/92

GEM Calorimeter Group Meeting - Tucson

Agenda and transparencies of the GEM Calorimeter Meeting held at the GEM Collaboration meeting in Tucson on March 8, 1992.

TN-92-00085

03/08/92

GEM Collaboration Meeting - Tucson

Agenda, attenders and transparencies of the GEM Collaboration Meeting held in Tucson on March 8-11, 1992.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-92-00086

Not Assigned

TN-92-00087

04/02/92

Central Tracker Meeting

Transparencies of the presentations at the April 2, 1992 meeting at the SSCL. Included are capacitance calculations and measurements for the IPC pads, status reports for Silicon Tracker, IPC electronics, simulations, and integration. A short discussion of test beam possibilities at SLAC is also included.

TN-92-00088

04/17/92

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TN-92-00089

04/14/92

GEM Detector For the SSC: U.S. - Republic of Korea Working Group Meeting

Sanders, Gary H.

Transparencies of the presentations at the April 14, 1992 Republic of Korea Working Group Meeting.

TN-92-00090

04/22/92

Liquid Argon Calorimeter Cost Review Meeting - SSCL

Transparencies of the presentations at the April 22, 1992 Liquid Argon Calorimeter Cost Review Meeting. Agenda items were: Resolution vs. Angle, Thickness; Status of Engineering; Cost Estimate; R&D Issues; Foreign Contribution Models; Preradiator; and Separate EM, EM+Forward.

This Document Number was changed to GEM IN-92-00003

TN-92-00091

04/04/92

Progress Report: Neutron Flux in the GEM Detector

Lee, David M.

Prael, R. E.

Waters, Laurie

The status of neutron fluence calculations throughout the GEM detector using the LAHET/MCNP code is described. Included are studies of fluence through the silicon vertex detector, and suppression obtainable with borated polyethylene. Also addressed are fluences within the endcap and forward calorimeters, as well as along the first muon chamber after the endcap. This report will be updated as new results are obtained, and old calculations are redone to reflect changes in detector geometry and materials.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-92-00092

04/27/92

Simulations of Accordion EM Calorimeters

Ma, Hong

This is a summary of the GEANT simulation of the non-projective accordion EM calorimeters. Most of the simulations are related to the prototype stacks that are being built at BNL. EM shower resolution, position resolution, $g \times p_0$ separation, chevron electrodes, resolution at large incident angle and effect of the cryostat walls are discussed.

TN-92-00093

09/25/91

Muon Drift Chamber Physics and Engineering R&D Activities for the L* and GEM Detectors in FY 1991

Ables, E.
Bionta, R. M.
Britt, H. C.
Capell, M.
Chargin, A. K.
Deis, G. A.
Fackler, O. D.
Johnson, Coleman
Lowry, M. E.
Makowiecki, D. M.
Masquelier, D. A.
McCammon, K.
McConaghy, C. F.
Olson, H. E.
Schmitt, E. H.
Skulina, K. M.
Vital, R. L.
Wenaus, T.
Wuest, Craig R.

This paper will describe the work carried out at LLNL on muon chamber R&D for the L* detector in FY 1991. Because of the L* proposal rejection in May, 1991, and the subsequent restructuring to form the GEM detector collaboration in July, 1991, the work described in this paper will also be seen to be applicable to the envisioned muon chamber subsystem for GEM.

TN-92-00094

05/01/92

Calorimeter Meeting SSCL

Agenda, presentation, and attenders of the GEM Calorimeter Meeting held at the SSC Laboratory on May 1, 1992. Agenda items were: Baseline Status; Forward Activities; Discussion on April 21/22 Cost Review and International Contributions; BaF2 Activities; SSCintCal Activities; LAr Activities; Quartz Fiber Calorimeter; SSCL Test Beam Facilities; and Simulations and Test Beam Data.

GEM DOCUMENTS INDEX
Document Number Index w/Abstract

TN-92-00095

04/30/92

Collaboration Council Meeting SSCL

Agenda and presentation of the GEM Collaboration Council Meeting held at the SSC Laboratory on April 30, 1992. Agenda items were: Status and News; GEM Facilities; Baseline 1 Overview; Subsystem Reports: Central Tracker; Calorimeters, Muons, Triggering/Electronics, Computing, Magnet, and Physics; Test Beam Report; R&D/Engineering; Cost Review; and Report/Discussion GEM Organization Committee.

TN-92-00096

03/01/92

Considerations Regarding Tube Wall Material

Ahlen, Steven
Marin, Alex
Zhou, Bing

We discuss several options for the PDT tube wall materials in our proposed pressure and temperature conditions. Physical properties of those options are presented, which, together with costs considerations, lead us to the conclusion that Aluminum PDTs should be the best choice.

TN-92-00097

04/09/92

Considerations on the Addition of Detector Planes Outside the GEM Magnet and on the Implementation of a Vertex Constraint

Rosenson, Larry

An investigation has been made of the possible performance improvements of the muon system with the addition of a fourth superlayer and also with the inclusion of a vertex constraint. It is recommended that space be reserved for the addition of a detector layer outside the cryostat in the barrel region for a potential improvement in the resolution and increase in robustness/redundancy. The endcap resolution is found not to be subject to improvement with the addition of an extra layer. The vertex constraint is likely to yield significant improvement over the whole angular range and provision should be made to measure and maintain the required global alignment of the vertex detector to permit its useful inclusion in the muon detector track reconstruction.

TN-92-00098

05/12/92

Shielding in 300 - 1000 G Background Field

Martovetsky, N. N.

Efficiency of shielding is very dependent on the volume to be shielded and on the shape of the iron shield. This is preliminary data for shielding in uniform field of 300 - 1000 G which covers the values of field flux density in the experimental hall in the median plane of the magnet outside the vacuum vessel. The objective of the study is to figure out the thickness of the shield to bring the field down to less than 50 G level.

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Document Number Index w/Abstract

TN-92-00099

05/18/92

Monte Carlo Studies of the Texas Test Rig Performance

Vanyashin, A. V.
Yost, G.

To test the performance of different muon chamber technologies proposed for the GEM experiment at the SSC, the Texas Test Rig (TTR) will be established at the SSC Laboratory. The results of Monte Carlo studies of TTR are presented. An optimized off-line selection algorithm is found.

TN-92-00100

05/01/92

Momentum Resolution Criteria for the Central Tracker

Zhou, Bing

We present our calculation of the GEM central tracker resolution necessary for muon identification. The production of top quark pair and its background is analyzed.

TN-92-00101

05/01/92

Study of Hadron Punchthrough and Muon Rates at the SSC

Chang, Yuan-Hann
Zhou, Bing

Hadron punchthrough probabilities functions of hadron energy and absorber length at the SSC are studied in detail. Energy spectra, charged multiplicity and the angular spread distributions of the punchthrough are presented. Total muon rates are calculated for the GEM detector baseline design.

TN-92-00102

04/29/92

Muon Group Meeting - SSCL

Agenda, attenders, and transparencies of the GEM Muon Group Meeting held at the SSCL on April 29, 1992. The meeting was to focus on preparations for the TTR tests this summer. Agenda items: General Issues; Review of Baseline; Definition of Goals for TTR Test; Status Reports of R&D Efforts; Discussion of TTR Test; Update on Simulations; Preparations for May 5 Cost Review; Assignment for TDR Preparation; and Discussion/Review.

TN-92-00103

05/01/92

$H_0 \rightarrow ZZ^* \rightarrow \lambda+\lambda^- \lambda+\lambda^-$: Search for $140 < M_{H_0} < 180$ GeV

Zhou, Bing

We present our calculation for the Higgs production in the case of four leptons in final state. The background for these events is analyzed. The triggers performance and requirement are presented.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-92-00104

05/28/92

IEEE Standard 754 and You: What the GEM Computer User Needs to Know About IEEE Floating-Point Arithmetic

Roberts, Lee A.

GEM computer users, for better or for worse, will interact with the IEEE Standard for Binary Floating-Point Arithmetic (IEEE 754). All of today's popular RISC/UNIX architectures support the IEEE 754 standard both in data format and exception handling. However, details of the IEEE 754 exception handling vary among the RISC/UNIX architectures. GEM code development efforts on these popular RISC/UNIX systems can be greatly enhanced with proper understanding of IEEE 754 exception handling. Suggestions for successful use of the IEEE 754 standard are presented for each of today's popular RISC/UNIX architectures.

TN-92-00105

05/28/92

Mylar Straw Tubes: Test Results and Applications to Muon Tracking

Chirikov-Zorin, I.
Gapienko, V.
Khasins, D.
Larichev, A.
Puchov, O.
Zajz, V.
Zhukov, V.

We report the test results of a 1 m long block of mylar straw tubes consisting of 64 channels. The spatial resolution and charge distribution have been obtained. The application to muon tracking of GEM are discussed.

TN-92-00106

05/20/92

Muon Engineering Status Meeting - M.I.T.

Agenda, attenders, and transparencies of the GEM Muon Engineering Status Meeting held at M.I.T. on May 20, 1992. Agenda items: Comments; Draper Management Information; Muon System Design: Structures, Chambers, and PDT Chamber Design; Alignment; Cost Book; and Action Items.

TN-92-00107

05/27/92

Muon Engineering Status Meeting - M.I.T.

Agenda, attendees, and transparencies of the GEM Muon Engineering Status Meeting held at M.I.T. on May 27, 1992. Agenda items: Comments; Report on SSCL Align MTG., 5/22; Update of Cost Matrix; Review of 5/20 Action Items; Review Draft Memo for A/I #4 (Magnet Info); Comments on Other Eng. Efforts; Action Items; and Set Agenda for Next Week.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-92-00108

06/03/92

Nondestructive Method for Beam Profile and Absolute Position Measurement

Maschke, A.W.

A narrowly collimated beam of low energy heavy atoms can be used as a probe to determine the profile and position of the SSC beam with resolution measured in microns.

TN-92-00109

06/04/92

Central Tracker Meeting - SSCL

Agenda, attendees, and transparencies of the GEM Central Tracker Meeting held at the SSC Laboratory on June 4, 1992. Discussions of Budgets, Simulations in Taiwan, R&D on IPC's, Integration Issues and Silicon Optimization.

TN-92-00110

06/05/92

Barium Fluoride Calorimeter Meeting - SSCL

Agenda, attendees, and transparencies of the GEM Barium Fluoride Calorimeter Meeting held at the SSC Laboratory on June 5, 1992. Agenda items included: Introduction; Calorimeter System Engineering Overview; GEM Engineering Integration Issues and Schedules; BaF2 Progress in China; LLNL R&D Progress; Discussion of BaF2 Detector Production Scenario; Scintillating Fiber HCAL Design and Test Status; Discussion of BaF2 and SSCintCal Engineering and GEM Detector Issues; BaF2 R&D and Options for Crystal Production and Test in Russia; BaF2 Radiation Damage Studies (U.S.); Discussion: Work Plan and Milestones for the GEM Decision, and TDR; Preliminary Discussion of R&D Needs for FY93, and Test Beam; Test with Hadron and the AGS and LAMPF in June; Cosmic Ray and UV Monitor Test Setups at UCSD and CMU; and Progress and Plans on BaF2 Simulation: Fast Simulation, Detector Calibration.

TN-92-00111

06/09/92

Et Fluctuations in Pileup Events as a Function of Pseudorapidity

Stern, Eric G.

The fluctuations in energy or transverse energy deposits in an ionization calorimeter determine the noise due to event pileup. For a calorimeter with uniform $\Delta\eta \times \Delta\phi$ segmentation, the fluctuations vary will vary with pseudorapidity ($\eta = -\log \tan \theta/2$) due to the interaction of the shower size with the changing physical size of the cell and particle particle density. We simulate the deposition of particles in a calorimeter using fairly simple assumptions about particle production distributions and energy deposition to determine the mean and fluctuations of the transverse energy measured in the simplified calorimeter. An analytic calculation of the same phenomenon agrees well with the simulation and provides an understanding of the contributing effects.

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Document Number Index w/Abstract

TN-92-00112

05/20/92

Collaboration Meeting in China

The agenda and transparencies of the GEM Collaboration Meeting in China held on May 20, 1992 at the Institute of High Energy Physics, Beijing. Agenda items: GEM Overview; Muon System; Liquid Argon Calorimeter; Barium Fluoride EMC; Scintillating HCAL; Central Tracker; Electronics in IHEP; and GEM Cost, Facility.

TN-92-00113

06/10/92

Muon Engineering Status Meeting - Draper

The agenda, attendees, and transparencies of the GEM Muon Engineering Status Meeting held on June 10, 1992 at Draper Laboratory are presented. Agenda items: Remarks - Frank Taylor; Overview-Draper Activities; Prep for PAC Meeting; Update of Cost Matrix; Design Issues; and Review/New Action Items.

TN-92-00114

04/16/92

Fringe Field and Dipole-dipole Force Interactions in GEM

Pillsbury, Jr., R. D.

A force and possibly a torque are experienced by magnetizable material when placed in a magnetic field. Initial estimates of the magnitudes and directions of the forces arising from an interaction of such material with the fringe fields of the magnet for the GEM detector have been made and are described.

TN-92-00115

06/04/92

Collaboration Council Meeting - SSCL

Agenda, attendees, and transparencies of the GEM Collaboration Council Meeting held at the SSC Laboratory on June 4, 1992. Agenda items are: Report from Spokesmen; Report of Progress on Full GEANT Simulation; GEM Baseline I and Evolution to Baseline II; GEM Physics Simulations; GEM Organization Committee Report; GEM Costing; Report on GEM Magnet; GEM News; Calorimeter Report; Muon Report; Central Tracker Report; and Electronics Report.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-92-00116 Rev. A

12/18/92

GEM Magnet Engineering Design Report

Altenbach, T.
Bowers, Joel
Chargin, A. K.
Deis, G. A.
Harris, Mike
House, F. A.
Hsu, W.
Johnson, Coleman
Marston, P. G.
Martovetsky, N. N.
Minervini, Joe
Myatt, R. L.
Ng, D.
Oberst, G.
Pedrotti, L.
Pillsbury, Jr., R. D.
Piek, Z.
Reardon, Paul
Smith, Bradford
Smith, Brian G.
Stroynowski, Ryszard
Sullivan, J. D.
Titus, P. H.
Vieira, R.
Warren, R.
Wineman, S.
Wisniewski, W. J.
Yamamoto, Robert

The GEM Magnet Engineering Design Report.

TN-92-00117

06/17/92

Muon Engineering Status Meeting - Draper

The agenda, attendees, and transparencies of the GEM Muon Engineering Status Meeting held on June 17, 1992 at Draper Laboratory are presented. Agenda items: Remarks - Frank Taylor; Overview-Draper Activities; Brief Outline of 'Cost' Presentation for Next Week's Meeting at SSCL; Prep for PAC Meeting; and Review/New Action Items.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-92-00118

06/05/92

Muon Group Meeting - SSCL

The agenda, attendees, and transparencies of the GEM Muon Group Meeting held on June 5, 1992 at SSC Laboratory are presented. Agenda items: General Issues; Summary of Neutron Source Tests; Status Reports of R&D Efforts; Proposal for CSCs in Barrel; How to Choose the Technologies; Update on Simulations; and Discussion/Review.

TN-92-00119

06/17/92

Calorimeter Group Meeting - Brookhaven National Laboratory

The agenda and transparencies of the GEM Calorimeter Group Meeting held on June 17-18, 1992 at Brookhaven National Laboratory are presented.

TN-92-00120

06/25/92

Alignment Requirements to Muon System

Mitselmakher, G.
Zhukov, V.

A discussion of alignment requirements of the GEM muon system is given. The possible schemes of alignment monitors are described.

TN-92-00121 Rev. A

06/29/92

Studies of Cathode Materials for the LSDT

Korytov, A.
Linder, K.
Nehrich, E.
Osborne, L. S.
Rosenberg, B.
Ross, G. D.

TN-92-00122

06/29/92

Neutron Sensitivity of LSDT Chamber

Korytov, A.
Linder, K.
Osborne, L. S.
Taylor, Frank E.

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Document Number Index w/Abstract

TN-92-00123 Rev. A

09/30/92

Studies of LSDT's in a Magnetic Field

Korytov, A.
Ross, G. D.
Sears, J.
Taylor, Frank E.

We performed a series of experiments upon a model drift chamber to study the sensitivities of observed electron drift times to the magnitude and direction of an externally applied, homogenous magnetic field, and to the strength of the electric field within the chamber. These experiments were conducted for the separate chambers gas mixtures Argon:Isobutane::1:3, Argon:Carbon Dioxide:Isobutane::60%:20%:11%. We found the spatial resolution within the chamber to be degraded by the Lorentz Angle Effect to between 5 and 15 μm for each of these mixtures. Only the Argon:Carbon Dioxide:Isobutane mixture displayed a significant response to a change in the strength of the electric field within the chamber.

TN-92-00124

06/01/92

Some Alignment Concepts for the GEM Muon Array

Paradiso, Joseph

This report introduces a basic alignment scheme for the GEM muon detector. Optical straightness monitors are described, and their application discussed. Alternative alignment technologies are suggested and techniques are identified that can provide multipoint measurements. The problem of global alignment is posed, and several concepts are presented to attain the required precision.

TN-92-00125

06/01/92

Alignment Requirements for the GEM Muon Detector

Paradiso, Joseph

A table of requirements is derived for local and global alignment of the GEM muon detector. Requirements are given for structural accuracy (to which the muon array must be constructed) and precision measurement (where dynamic measurements of detector position may be used to compensate the location of superlayer spacepoints). In order to facilitate the rapid updating of requirements as the detector definition evolves, details are given on the requirement derivation.

TN-92-00126

06/01/92

Intermediate Mass Higgs Searches with GEM Detector : $H \rightarrow \gamma\gamma$: $H(\text{tt}/W) \rightarrow (\mu/e)\gamma\gamma X$: $H \rightarrow e^+ e^- e^+ e^-$

Yamamoto, Hiroaki
Zhu, Ren-yuan

This report summarizes a study on signal and background for intermediate mass Higgs searches at SSC by using precision electromagnetic calorimeters proposed by GEM collaboration. Searches by using $H \rightarrow \gamma\gamma$, lepton associated production channel $H(\text{tt}/W) \rightarrow (\mu/e)\gamma\gamma X$ and $H \rightarrow e^+ e^- e^+ e^-$ are discussed. Various physics as well as detector design issues were investigated. The backgrounds from real photons and electrons are misidentified photons and electrons originated from jets are elaborated.

GEM DOCUMENTS INDEX
Document Number Index w/Abstract

TN-92-00127

05/22/92

Separation of Higgs Event Vertex from Minimum Bias Events

Yamamoto, Hiroaki

Precise event vertex determination is very important for the measurement of the intermediate mass Higgs decaying into two γ s. This note summarizes the result of the selection of the Higgs event vertex using the charged particle multiplicity when there are minimum bias events in the same bunch crossing. The probability to select the correct vertex is 85 to 95%, depending on the model of minimum bias events, for the Higgs mass range of 80 to 160 GeV, and the result is insensitive to the track reconstruction efficiency.

TN-92-00128

06/30/92

FAST Simulation Meeting

Agenda, attendees, transparencies and draft reports from the final FAST Simulation Meeting, held at the SSCL, before the July 1992 PAC Meeting.

TN-92-00129

06/18/92

Radiation Effect in Hydrolyzed Barium Fluoride Crystal

Chen, L. Y.

Du, J.

Gu, M.

Wang, J.

Wang, L. M.

Xiang, K. H.

Li, X. P.

Yu, F. H.

Zheng, W. H.

With SCC-DV-X α theoretical calculations, we have found that U, OH-, O- and O₂- centers would be the potential causes of γ -irradiation damage in BaF₂ crystals. For better understanding of their behavior in actual processes, radiation effects in hydrolyzed BaF₂ was investigated. Thermal annealing of BaF₂ samples in air above 900°C was performed. The characteristics of optical absorption curves of samples before and after γ -irradiation with doses of 1 x 10 to 6th power rad were determined in the VUV, UV and IR regions. The results demonstrate that OH- ion can be incorporated into BaF₂ by means of hydrolysis, with an absorption maximum at 192 nm and a complex absorption band in the IR region between 3100 ~ 3700 cm⁻¹. In the VUV region, the absorption edge shifts towards lower energy from 134 nm to 150 nm. The latter is close to that of the samples grown at low vacuum. After irradiation, several new absorption peaks at 204 nm and ~ 240 nm corresponding to U and O- centers, respectively, were observed. An explanation is given in terms of OH- and O₂-V α decomposition through radiolysis to form U, O- and F-related centers, which correspond to the 793.75 cm⁻¹ absorption in IR, ~ 240 nm and ~670 nm absorption bands respectively.

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Document Number Index w/Abstract

TN-92-00130

07/10/92

Status of GEM Baselines

Marx, Michael

This document summarizes GEM Baseline 1 and discusses issues and options under study for Baseline 2.

TN-92-00131

07/08/92

Responses to the December 1991 PAC Report

Barish, Barry

This document contains GEM responses to the comments and questions in the December 1991 PAC Report. It is written in question/answer format to directly respond.

PAC

TN-92-00132

07/02/92

Collaboration Council Meeting - SSCL

Agenda, attendees, and transparencies of the GEM Collaboration Council Meeting held at the SSC Laboratory on July 2, 1992.

TN-92-00133

07/03/92

Muon Group Meeting - SSCL

Agenda, attendees, and transparencies of the GEM Muon Group Meeting held at the SSC Laboratory on July 3, 1992. Agenda items are: General Issues; Discussion of Changes for New Baseline; Electronics Issues; Status Reports of R&D Efforts; Mechanical Engineering Update; Update on Simulations; and Discussion/Review.

TN-92-00134

07/13/92

Muon Engineering Status Meeting - M.I.T.

Agenda, attendees, and transparencies of the GEM Muon Engineering Status Meeting held at the Massachusetts Institute of Technology on July 13, 1992. Agenda items are: Comments; Draper Overview/PAC Deliverables; Selection Criteria/Barrel Structure; CSC in the Barrel; Alignment (Local) Update; Barrel CSC Alignment; Engineering Update at Draper; Efforts at Dubna; and Discussion/Action Items.

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Document Number Index w/Abstract

TN-92-00135

07/23/92

Muon Engineering Status Meeting - Draper

Agenda, attendees, and transparencies of the GEM Muon Engineering Status Meeting held at Draper Laboratories on July 23, 1992. Agenda items are: Overview of Activities; Comments; Overview Sector/Wheel; Criteria Doc(Wheel/Sector); Structure/Design/Analysis; Assembly/Installation; Alignment Update; CSC Update; LSDT Update; and Discussion/Action Items.

TN-92-00136

07/09/92

X-Ray Test Station for Cathode Strip Muon Chambers

Lapina, L. P.
Levchenko, P. M.
Smirnov, A. I.
Suvorov, V. M.
Vorobyov, An. A.

A proposal is presented to construct an X-ray diagnostic device which could measure all properties of the cathode strip chambers (CSC). It is shown that by using an appropriate cathode and a silicon crystal monochromator one can utilize hard enough X-rays (36 Kev) to penetrate an entire superlayer while maintaining spatial resolution of the order of 25 microns.

TN-92-00137

07/04/92

The Effect of Inclined Tracks and the Lorentz Angle on the Spatial Resolution of the Interpolating Cathode Strip Chambers

Polychronakos, V. A.
Tcherniatine, V.

The effect of inclined tracks and the Lorentz angle on the spatial resolution of the cathode strip chambers (CSC) is discussed. It is shown that for the gas mixture considered for these chambers and for the 0.8T magnetic field in GEM the resolution degradation as a function of angle of incidence both in the barrel and in the endcaps is less than 10% if the Lorentz effect is compensated for by tilting the chamber (barrel) or rotating the wires (endcaps). Further it is shown that knowledge of the magnetic field is not necessary to better than ~ 20%.

TN-92-00138

08/04/92

Electronics Trigger DAQ Meeting - SSCL

Agenda, attendees and presentations of the GEM Electronics/Trigger/DAQ Meeting held at the SSC Laboratory on August 4, 1992. Agenda Items: Preliminary Remarks-Marlow; Si Vtx Status; IPC Status; Cal Status; Level 1 Calorimeter Trigger Studies; Calorimeter Zero Suppression Study; Datawave Study; CSC Readout Architectures; General: What Should DAQ Include; and R&D Plans.

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TN-92-00139 08/04/92

Higgs to Gamma Gamma Task Force Meeting - SSCL

Attendees, minutes and presentations of the GEM Higgs to gamma gamma Task Force Meeting held at the SSC Laboratory on August 4, 1992.

TN-92-00140 09/11/92

Responses to Questions Regarding Engineering Issues of the GEM Noble Liquid Calorimeter Options

Adams, T.
Barnstable, K.
Brogan, J.
Coulon, J.
Easom, B.
Gordon, H.
Lajczok, M.
Mason, L.
Velasques, G.
Vinnedge, W.

Describes the present baseline parameters for the liquid argon calorimeter system. We are also investigating the use of krypton as the sampling medium to improve the resolution further. For the same density, one will be able to increase the sampling ratio by reducing the plate thickness and increasing both the density and volume of the sensitive material. Krypton option parameters are provided in the attached figures.

TN-92-00141 08/05/92

Collaboration Council Meeting - SSCL

Agenda and presentations of the GEM Collaboration Council Meeting held at the SSC Laboratory on August 5, 1992. Agenda items were: GEM Status and News; Discussion of PAC Review; Report from GEM Project Office; Status and Plans of GEM Systems: Magnet, Trigger, Central Tracker, Calorimetry, and Muons; and TDR Planning.

TN-92-00142 08/12/92

Muon Engineering Meeting - SSCL

Agenda, attendees and presentations of the GEM Muon Engineering Meeting held at the SSC Laboratory on August 12, 1992. Agenda items were: Status of Structure Decision Memo; Gussets?; Review of Facilities Needed BW vs. S; Alignment Paths in Support Structure; Status of Stress Analysis; Optimization of Support Structure; and Who's Doing What - Action Items.

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Document Number Index w/Abstract

TN-92-00143 08/05/92

Calorimeter Group Meeting - SSCL

Agenda and presentations of the GEM Calorimeter Group Meeting held at the SSC Laboratory on August 5, 1992. Agenda items were: Noble Liquid; BaF₂; H → 2γ Task Force; and Discussion.

TN-92-00144 07/10/92

Report of the Superconducting Super Collider Program Advisory Committee

Report from the PAC on the operations of the SSC Laboratory. Included is a comparison of the physics capabilities of the proposed SDC and GEM detectors, an evaluation of the SDC plans for construction of a detector, an evaluation of the GEM plans for construction of a detector, and guidance for possible smaller experiments.

TN-92-00145 08/18/92

Magnet Subsystem August Subcontractor Information Meeting - SSCL

Agenda and presentations of the GEM Magnet Subsystem Subcontractor Information Meeting held at the SSC Laboratory on August 18, 1992. Agenda items included: GEM and GEM Magnet Project Update; Technical Update Information; Facility Design Update; Cryostat and Support System Design Update; Cold Mass Design Update; Fabrication Plan Outline; Business/Procurement Status Update; and Summary and Closing Remarks.

TN-92-00146 07/27/92

On the Problems of Oxygen-related Impurity Induced Radiation Damage in the Barium Fluoride Crystal

Wang, L. M.
Chen, L. Y.
Gu, M.
Xiang, K. H.
Du, J.

This report presents a mechanism of oxygen incorporated by the hydrolysis of OH⁻ ion rather than the oxidation. The theoretical model of radiation damage in BaF₂ is developed which UV absorption bands are chiefly caused by O⁻ related impurity centers formed from oxygen-related impurities by the ionization. The explanations for several key observations are given. Finally, based on the mechanism of radiation damage we propose several methods to improve the radiation resistance of BaF₂ crystals.

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Document Number Index w/Abstract

TN-92-00147

05/07/92

Study on Undoped CsI Crystals

Wei, Zhong-ying
Zhu, Ren-yuan

This report summarizes main results of a study on scintillation properties and radiation resistance of large size undoped cesium iodide (CsI) crystals produced in former Soviet Union. The results of this study indicate that with existing quality, undoped CsI crystal may be used in high counting rate environment with integrated radiation dosage up to 10 kRads. Improvements in radiation resistance are needed, however, if they are to be used in very high radiation environment, such as SSC and LHC.

TN-92-00148 Rev. A

09/13/92

Light Attenuation Length of Barium Fluoride Crystals

Ma, Da-an
Zhu, Ren-yuan

This report presents a deduction of a formula which can be used to calculate the light attenuation length of barium fluoride crystals based on the transmittance (or absorbance) data measured by a spectrophotometer.

TN-92-00149 Rev. A

09/13/92

On Optical Bleaching of Barium Fluoride Crystals

Ma, Da-an
Zhu, Ren-yuan

This report presents results on optical bleaching for 25 cm long BaF₂ crystals to be used in constructing the a BaF₂ calorimeter at the SSC. A practical scenario of implementing optical bleaching in situ and the requirements on the light sources used to bleach the entire GEM BaF₂ calorimeter are presented.

TN-92-00150

10/01/92

Analysis of an Alignment Scheme for the GEM Muon Barrel

Paradiso, Joseph

An analysis package has been developed to investigate an alignment scheme defined for the GEM muon barrel. Individual chambers can be arbitrarily translated and/or rotated, and sagitta corrections are calculated from a system of alignment monitors. The sagitta error, correction, and residual are plotted (vs. θ and ϕ) for straight-line tracks arising from the IP. Using this package, intuition may be developed into the accuracy and nature of particular alignment corrections. Several effects have been found to limit the error correction to the percent or permil levels for certain chamber deflections, which may become significant for large misalignments.

This document is actually date "October 1992".

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Document Number Index w/Abstract

TN-92-00151

09/29/92

Texas Test Rig Laboratory Safety Evaluation

Guthrie, Richard
Woolley, Ronn P.

This document is the safety evaluation for the Texas Test Rig (TTR) Laboratory. It's primary function is the identification of hazards, their mitigation and an appraisal of the overall safety of the TTR and its operation.

TN-92-00152

10/09/92

TTR Emergency Procedures

Guthrie, Richard
Woolley, Ronn P.

This document describes the Physics Research Division (PRD) GEM Texas Test Rig experimental prototype's emergency procedures, for it's personnel. To assure personnel safety and quality of emergency response by describing proper personnel action requirements and procedures.

TN-92-00153

10/09/92

TTR Start Up Procedures for Test Chambers

Guthrie, Richard
Stocker, Frank

This procedure is to establish general requirements for bringing the Test Chambers into normal operating conditions.

TN-92-00154

10/09/92

TTR Purging Procedure for Test Chambers

Guthrie, Richard
Stocker, Frank

This procedure is to establish general requirements for purging the Test Chambers before beginning into normal operating or before deactivation of a Test Chamber.

TN-92-00155

10/09/92

TTR Leak Check Procedure for Test Chambers

Guthrie, Richard
Stocker, Frank

This procedure is to establish general requirements for leak checking the Test Chambers before beginning normal operations.

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Document Number Index w/Abstract

TN-92-00156

10/09/92

Laser Operating Procedures for TTR

Bonushkin, Yuri
Stocker, Frank

This procedure is to establish general requirements for the normal operation of the laser experiment of the TTR.

TN-92-00157

10/09/92

Maintenance Procedures for Texas Test Rig Laboratory

Stocker, Frank
Zimmer-Nixdorf, Ewald

This document provides the maintenance procedures for the Texas Test Rig (TTR) Laboratory. It details the general steps needed to safely perform maintenance on the TTR and its associated equipment.

TN-92-00158

10/09/92

Gas Emission Tracking Procedures for Texas Test Rig Laboratory

Stocker, Frank

This procedure is to establish general requirements for tracking gas emissions for the TTR.

TN-92-00159

10/09/92

TTR Shut Down Procedure for Test Chambers

Stocker, Frank

This procedure is to establish general requirements for taking the Test Chambers out of service.

TN-92-00160

10/09/92

TTR Change Over Procedure for Test Chambers

Stocker, Frank

This procedure is to establish general requirements for changing the gas mixture in the Test Chambers during normal operating conditions.

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Document Number Index w/Abstract

TN-92-00161

08/24/92

Generation of a Precisely Timed Muon Trigger Using Signals from the GEM Drift Tubes

Barabash, L. S.
Bromberg, C.
Fisyak, Yuri
Lau, Norman
Marlow, Daniel
Miller, R.
Mitselmakher, G.
Wang, A.
Zhukov, V.

An approach for generation of a muon trigger signal with a time resolution good enough to identify the bunch crossing is described. The proposed circuit provides a timing pulse that is independent of the position and angle of incidence. The pulse is delayed with respect to the muon time of arrival by a constant amount, approximately equal to the total drift time in a single cell.

TN-92-00162

09/21/92

SIGEM - Full Geant Simulation for GEM Detector (Status Report)

Fisyak, Yuri
McFarlane, Kenneth
Roberts, Lee A.

The present status of the full GEM simulation program is described. The program is based on GEANT 3.15 and closely follows the style of GEANT. Features include "hits" in all subdetectors. A description is given of the program structure, the materials used, and the convention for rotation matrices, followed by a summary of data cards. The main GEM geometrical volumes are shown, using the Baseline 1 design. The procedure for forming "hits" is described as well as the convention for saving and retrieving data. Instructions (scripts or command files) are given for installation and running on VAX/VMS, HP-UX, Sun, DEC-Ultrix and SGI. Results based on a preliminary analysis of 10 bunch crossing of minimum bias events passed through SIGEM are discussed.

TN-92-00163

07/24/92

Barium Fluoride Research and Development at Lawrence Livermore National Laboratory

Fuchs, Ben H.
Kway, W.
Wuest, Craig R.

Lawrence Livermore National Laboratory (LLNL) has participated in an active R&D program for the Barium Fluoride Collaboration since March 1992. In this time a number of different research programs have been carried out. These areas include: 1) crystal surface preparation and analysis, 2) UV reflective coatings and coating technology, and 3) crystal growing. This paper will present a brief summary of the work in these three areas as well as a summary of a recent trip to China to assess the technical capabilities of different institutes and factories in China. Also a number of sketches, summary view graphs, photographs and documents are included.

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Document Number Index w/Abstract

TN-92-00164

07/01/92

Fully Pipelined and Programmable Level 1 Trigger

Crosetto, D.

Love, L.

The types of detectors and the physics involved in present experiments are reaching a level of cost and complexity so great that it is preferable to implement a programmable trigger solution at all levels rather than a system realized with cabled logic. Experience demonstrates that the fine tuning on the trigger is often only achieved after running an experiment and analyzing the first data acquired. Recent advances in technology made real-time programmable algorithms down to the Level 1 trigger feasible. In this report a number of algorithms for the first level trigger have been simulated using one of the most advanced chips available. A fully-pipelined and programmable Level 1 trigger system sustaining a clock rate of 16 ns has been designed based on a modified version of the DataWave chip.

TN-92-00165 Draft

08/31/92

GEM Detector: Noble Liquid Hybrid EM Calorimeter Design Study

Bailes, D.

Chae, S. M.

Claffey, C. E.

Kincaid, D. J.

Rennich, M. J.

Smirnov, A. I.

Webb, D. S.

This document describes a proposed design for a GEM hybrid calorimeter. The fiber hadron portion of the calorimeter is detailed in a companion document entitled "Fiber Hadron Calorimeter Design and Costing Update, August 31, 1992". Consequently, this report focuses only on the noble liquid EM calorimeter. However, the parameters for the hybrid fiber configuration are included.

TN-92-00166

08/31/92

BaF2 Meeting - SSCL

Presentations of the GEM BaF2 Meeting held at the SSC Laboratory on August 31, 1992.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-92-00167

07/01/92

Two Methods to Estimate the Position Resolution for Straw Chambers with Strip Readout

Golutvin, I. A.

Movchan, S. A.

Peshekhonov, V. D.

Preda, T.

The chambers with cathode readout are a good alternative to the drift chambers of muon detector systems for the future colliders SSC or LHC, due to their high position resolution. The straw chambers with strip readout possess a big advantage over, for example, honeycomb strip chambers: if one chamber is damaged the other chambers continue working due to the external strips. While processing the experimental data we have used only induced signals on three significant strips; for big detectors, it would avoid the storage of a great amount of information per event. The position resolution computing was done with the centroid and charge-ratio methods. In this article we present both methods in connection with the straw chamber particular case.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-92-00168

09/01/92

Accordion Liquid Argon/Krypton Calorimetry for GEM: Response to Questions from the Collaboration

Benary, O.
Cannon, S.
Cleland, W.
Ferguson, Ian
Finley, C.
Gordeev, A.
Gordon, H.
Kistenev, E.
Kroon, P.
Leltchouk, M.
Lissauer, D.
Ma, Hong
Makowiecki, D. M.
Maslennikov, A.
McCorkle, S.
Onoprienko, D.
Onuchin, A.
Oren, Y.
Panin, V.
Parsons, J.
Radeka, V.
Rogers, L.
Rahm, D.
Rescia, S.
Rutherford, John P.
Seman, M.
Smith, M.
Sondericker III, J.
Steiner, R.
Stephani, D.
Stern, Eric G.
Stumer, Iuliu
Takai, H.
Themann, H.
Tikhonov, Y.

Responses to questions from the GEM Collaboration concerning the Accordion Liquid Argon/Krypton Calorimetry option.

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Document Number Index w/Abstract

TN-92-00169

09/01/92

High Precision Straw Tube Chamber With Cathode Readout

Bychkov, V. N.
Golutvin, I. A.
Ershov, Yu. V.
Zubarev, E. V.
Ivanov, A. B.
Lysiakov, V. N.
Makhankov, A. V.
Movchan, S. A.
Peshekhonov, V. D.
Preda, T.

The high precision straw chamber with cathode readout was constructed and investigated. The 10 mm diameter straws were made of aluminized mylar with transparent longitudinal window. The X coordinate information has been taken from the cathode strips as induced charges and investigated by centroid method. The spatial resolution $\sigma_x = 120 \mu\text{m}$ was obtained at the signal/noise ratio about 60. The possible ways to improve the signal/noise ratio is discussed.

Date is the date it was submitted for distribution and not the date it was written.

TN-92-00170

08/31/92

GEM Detector BaF2 Precision EM Calorimeter Selection Report

California Institute of Technology
University of California, San Diego
Princeton University
Carnegie Mellon University
Brookhaven National Laboratory
Oak Ridge National Laboratory
Lawrence Livermore National Laboratory
Shanghai Institute of Ceramics
Beijing Glass Research Institute
Beijing Institute of High Energy Physics
Beijing University
Shanghai Institute of Nuclear Physics
Tongji University
Tsinghua University
University of Science and Technology, Hefei
Zhongnan Optical Instrument Facility
Tata Institute of Fundamental Research

Answers to questions from the GEM Collaboration concerning the BaF2 Precision EM Calorimeter option.

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Document Number Index w/Abstract

TN-92-00171

08/30/92

Tsinghua - SSCL GEM Collaboration

Tsinghua University

The memorandum and proposal to establish an arrangement that Tsinghua University can most effectively perform collaboration on the GEM Project of the Superconducting Super Collider (SSC).

TN-92-00172

08/28/92

TART Calculations of Neutron Attenuation and Neutron-induced Photons on 5% and 20% Borated Polyethylene Slabs

Wuest, Craig R.

The coupled neutron/photon transport code TART has been used to calculate the attenuation of neutrons and the production of induced photons for neutrons incidents on 5% and 20% borated polyethylene slabs. The neutron attenuation lengths are found to be 2.4 cm and 2.9 cm for 5% and 20% borated polyethylene, respectively.

TN-92-00173

09/01/92

Report of the BaF2 Expert Group

The BaF2 expert group met on August 31, and September 1, 1992 at the SSC Laboratory to review new data regarding radiation damage issues on BaF2 crystals obtained since the August 3-4, 1992 BaF2 Panel meeting. This BaF2 expert group, comprised of a sub-set of the original Panel members, was convened at the request of the spokesman for the BaF2 collaboration, Professor Harvey Newman, with the authorization of the GEM Detector Management. Data was presented on the first day by various researchers, including the proponents of BaF2 Electromagnetic Calorimeter. This data included new results of optical annealing of radiation damaged crystals as well as the implementation of annealing methods and systems in-situ. In addition new information was presented by representatives from the Shanghai Institute of Ceramics/Chinese Academy of Sciences on barium fluoride crystal production issues.

TN-92-00174

09/04/92

Electronics Meeting-SSCL

Agenda and presentations of the GEM Electronics Meeting held at the SSCL on September 4, 1992. Agenda items are: Preliminary Remarks & Meeting Schedule; Short Reports: Digital Discriminator, Datawave Update, Pipeline ADC's, SDC Calorimeter Review; Status Reports: Calorimeter Readout, IPC Readout; DAQ Design for GEM; and R&D Plan.

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Document Number Index w/Abstract

TN-92-00175

09/03/92

Collaboration Council Meeting - SSCL

Agenda, attendees, and presentations of the GEM Collaboration Council Meeting held at the SSCL on September 3, 1992. Agenda items are: Status and News; Project Manager Report; Facilities Status; Magnet Update; Calorimetry Report; BaF2; Liquid Argon; Overviews and Issues for Decision; and Muon Status/Plans toward Technology Choice.

TN-92-00176

08/10/92

Muon System of the GEM Detector at the SSCL as Presented at the 3rd International Conference on Advanced Technology and Particle Physics - Villa Olma, Como (Italy), June 22-26, 1992

Taylor, Frank E.

The GEM Muon System is based on a large super conducting solenoidal magnet with no magnetic flux return. Three superlayers of muon tracking chambers are deployed outside the calorimeter to reconstruct the sagitta of the muon trajectory in the magnetic field. Iron flux concentrators are placed along the central axis of the magnet to create a radial component of the magnetic field, thereby increasing the momentum resolution at small angles. The muon system can be triggered, based on transverse momentum, and muon trajectories can be reconstructed from $|\eta| = 0$ to 2.5.

TN-92-00177

08/31/92

Memorandum Formalizing the Schedule and Process to Obtain Full Approval of the GEM Detector

Luth, Vera

The purpose of this letter is to formalize recent discussions on the schedule and process that is designed to obtain full approval of the GEM detector as soon as possible.

TN-92-00178

09/17/92

Experience Background on Muon Detectors and Gas Chambers in IHEP of Beijing

Chen, Yuan-bo
Guo, Ya-nan
Xie, Yi-gang

The experiences of IHEP - Beijing about mass production of muon detectors for domestic experiments and international collaborations, as well as, some research on gas chambers are presented. In addition, preliminary investigation into some gas detector characteristics relating to GEM muon sub-detector candidates are discussed.

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Document Number Index w/Abstract

TN-92-00179

08/27/92

Experimental Data on GEM LAC FCAL Tube Design

Carlos, William Don
Ferguson, Ian
Forden, G. E.
Harlow, Lyle
Loch, Peter
Rutherford, John P.
Shaver, Leif
Steinberg, Joel
Zeitnitz, Christian

While ionization sampling calorimetry using liquid argon is a well tested technique, the particular tube electrode design proposed for GEM forward calorimetry is unique. This paper reports experience with such tube electrodes which suggests that this electrode configuration will behave just as expected.

TN-92-00180

06/22/92

Preliminary Study of the GEM Detector Fringe Field Effect on the Accelerator Units

Martovetsky, N. N.

The perpendicular component of the magnetic field has been evaluated in the forward direction along the beamline in the experimental hall of the GEM detector, taking into account ferromagnetic collimator and shield of the first quadrupole.

TN-92-00181

09/14/92

Description of GEM Magnet Conductor Program

Marston, P. G.
Martovetsky, N. N.
Minervini, Joe
Reardon, Paul
Scanlan, R.
Smith, Bradford
Vieira, R.

Technical parameters, preliminary specifications and test/inspection requirements are presented for the GEM conductor.

TN-92-00182

08/27/92

Effects of Light Exposure on Irradiated Barium Fluoride Crystals

Mauger, G. Joseph
Wuest, Craig R.

Small barium fluoride crystals have been irradiated using Cobalt-60 gamma rays under various illumination conditions to establish the effect of photo-bleaching of the radiation-induced color centers. This paper describes results of a few different experiments conducted at LLNL over the past few weeks.

GEM DOCUMENTS INDEX

Document Number Index w/Abstract

TN-92-00183

09/17/92

EM Calorimeter Meeting - SSCL

Agenda, attendees, and presentations of the GEM EM Calorimeter Meeting held at the SSC Laboratory on September 17, 1992. Agenda items are: Optimization of the GEM EM Noble Liquid Calorimeter; Discussion of RD3 Preshower Approach; Parallel Plate Preradiator Solution; Fine Strips in the Accordion Structure; Specification to Pointing in the EM Calorimeter; Pi-zero Rejection Using Shape Analysis Only; DRDC Preshower Detector Design; and Discussion and Work Assignments.

TN-92-00184

09/21/92

SSCintCAL Hadronic Calorimeter Photomultiplier Readout System Stability and Calibration Issues

Akchurin, Nural
Onel, Yasar

The ZEUS collaboration adds to the already numerous experiments which successfully deal with the issues of stability, monitoring and calibration in photomultiplier based calorimeters systems. They can maintain 1% tower-to-tower and module-to-module energy calibration with 0.2% overall stability. The entire calorimetry system of ZEUS consists of ~ 13000 PTMs. A CDF study reports that the difference of the calibration results done five weeks apart on four modules (ten towers each) shows an RMS of $0.2 \pm 0.7\%$. An ^{241}Am a-source was used to monitor ~ 1000 channels of Pb-glass electromagnetic calorimeter at FNAL E704. In 50 days, with ^{241}Am a-source only, a stability of $< 1.0\%$ was achieved. JETSET with 324 PMTs is a very stable system based on calibration and monitoring over two-week periods. Relative gain normalization was measured at 0.5 Hz by using a nitrogen laser dispersed with a prism to the front of ~ 100 fibers. The gains were normalized to 0.5%. For absolute calibration (again at the 0.5% level), JETSET used two methods; first, they calibrated coarsely with mip muons and single punchthroughs, and second, they improved the calibration by finely tuning with respect to the po peak. Even before the po correction, a calibration of less than 1% was accomplished. A similar laser system was employed for a 600-PMT system at Bugey reactor for relative calibrations. The short term stability of 0.5% (days) and a long term stability of 1.4% (2 to 3 years) were measured. FNAL experiment T840 shows that ~ 2.3% global calibration with a mechanically driven radioactive source is easily achieved for a scintillating fiber calorimeter prototype of 60 individual channels. The same technique with longitudinal and transverse source scans is exploited for attenuation length, local radiation damage, uniformity of response and calibration monitoring by T840.

Hamamatsu R2490-05 (baseline choice) 2" mesh dynode proximity focusing photomultiplier is stable beyond ~ 1 Tesla of magnetic field with a gain of $\sim 2 \times 10^5$ and with a rise time of $< 3\text{ns}$. The fine mesh dynode structure extends the current range up to 1A with 0.1% deviation and it still remains linear within 2% at 2A. The typical temperature dependence of the gain, times the quantum efficiency product, is in the range of 0.25 - 0.5%/oC for the PMTs used in ZEUS and CDF. It is clear that from the extensive studies and results of the aforementioned experiments, the stability ($< 1\%$), monitoring and calibration ($\sim 1\%$) issues can be satisfactorily addressed for the GEM scintillating fiber hadronic calorimeter

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Document Number Index w/Abstract

TN-92-00185

09/22/92

Fiber Hadron Detector for GEM

Paar, Hans Peter
Sulak, L. R.

This report summarizes GEM Technical Notes that document in detail the status of scintillating hadron fiber calorimetry for the SSC. These reports demonstrate that the fiber hadron calorimeter fulfills all GEM requirements. It will operate with the baseline performance at the highest SSC luminosities.

TN-92-00186 Draft

09/23/92

Scintillating Fiber Hadron Calorimeter Calibration and Monitoring Plan

Sullivan, J. D.
Eberle, C. C.
Paar, Hans Peter
Winn, D. R.

The calibration and monitoring plan for the GEM Scintillating Fiber Hadron Calorimeter covers the procurement, fabrication, assembly, and operation phases. The components to be calibrated and monitored include the copper and tungsten absorber blocks, the plastic and quartz fibers, the optics package, the PMTs, and the electronics. Many procedures, e.g., pulse injection, optical light injection, moveable radiosources, and CR muons, are used in all phases of manufacturing to insure quality control. This intercalibration and monitoring of all modules throughout the fabrication and assembly process carries over to actual operation where the same procedures are again used.

FNAL and SSC test beams are required to verify physics simulations and to characterize modules of 20 different geometries. The goal is to minimize the constant term in the energy resolution and to determine the constants needed to achieve effective compensation of the composite calorimeter. The measurements for each physics tower geometry provide complete characterization of shower shapes and measure the response (e/h) as a function of energy for electrons, pion and jets from ~ 10 GeV to 2 TeV. Although past experience shows that statistical sampling is sufficient to monitor production quality, the schedule assumes all modules will be checked in test beams to insure verification of the intercalibration.

Calorimeter; Scintillating Fiber; Hadron

TN-92-00187

09/23/92

Optimization of the GEM Integrated Noble Liquid Calorimeter

Noble Liquid Calorimeter Group

In this note we present a variation of the Integrated Noble Liquid Calorimeter design. It is not meant to be the final optimization but rather as a step along the way that will result in the best calorimeter GEM can build within certain constraints.

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Document Number Index w/Abstract

TN-92-00188

09/25/92

GEM Forward Calorimetry: A General Description of the Liquid Argon Option

Rutherford, John P.

The forward calorimeters for GEM are unique in that they will be located relatively close to the interaction point. This strategy has been examined in detail for a liquid argon technology using a new electrode structure of concentric tubes with narrow gaps. Following a general review of the requirements for GEM forward calorimetry is an overview of the liquid argon option.

TN-92-00189

09/23/92

On Radiation Damage and the Hadronic Calorimeter Choice of GEM

Wigmans, Richard

The importance of radiation damage for the hadronic calorimeter choice of GEM is investigated. The radiation levels in this part of the detector stay well under 1 Mrad/yr for the entire barrel/endcap range ($-3 < \eta < 3$) when the SSC operates at design luminosity. At a luminosity of 10 to 34 th power $\text{cm}^{-2}\text{s}^{-1}$, in 10 years less than 5 Mrad will be accumulated at $\eta = 2.5$ and at maximum 25 Mrad at $\eta = 3$. The accumulated doses in the entire barrel region stay well below 1 Mrad under these harsh conditions. The radiation hardness of commercially available fibers is such that no unacceptable degradation in the hadronic calorimeter performance occurs up to levels of about 10 Mrad. If one would decide to replace fibers after they receive 10 Mrad, only of the order of 1% of the fibers would qualify for this operation in a period of 10 years SSC running at $\mathcal{L} \approx 10$ to 34 th power $\text{cm}^{-2}\text{s}^{-1}$. If liquid argon were chosen as the active material of the hadron calorimeter, the three time higher neutron flux created in that way would jeopardize the electronics buried inside the calorimeter volume and elsewhere. Moreover, it would proportionally increase the problems caused by induced radioactivity and by spurious hits in the tracking and muon detectors.

TN-92-00190

05/13/92

Supplemental Environmental Analysis of the GEM Magnet

Woolley, Ronn P.

The text of the environmental analysis document submitted for DOE approval on May 14, 1992. This document's designation was reclassified from an Internal Note to a Tech Note on September 23, 1992.

TN-92-00191

05/13/92

Environmental Analysis for the Proposed Change in the Detailed Design for the Gammas, Electrons and Muons (GEM) Detector for the Superconducting Super Collider

Cipriano, Joseph
Ziemer, Paul L.

Memorandum from the Department of Energy responding to a request from Joseph Cipriano for an Environmental Analysis of the GEM Detector.

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Document Number Index w/Abstract

TN-92-00192

09/02/92

Muon Group Meeting - SSCL

Agenda, attendees and presentations of the GEM Muon Group Meeting held at the SSC Laboratory on September 2, 1992. Agenda items are: General Issues; Big Wheel Versus Sector Recommendation; Discussion of Recommendation; Engineering Input to Technology Decision; Status of Reports of R&D Efforts; Technology Decision Process; R&D for FY93; Electronics Issues; Report of Muon Neutron Committee; Update on Simulations; and Discussion/Review.

TN-92-00193

10/05/92

PCHTHR - A Fast Simulation for Hadron Punchthrough

McNeil, R. R.

A GEANT simulation of single pions of various momenta from 5 59 800 GeV/c through iron absorber of thickness 6l to 30l is used to produce punchthrough shower profiles. These profiles are compiled in probability tables which are read by a program PCHTHR which produces fast punchthrough showers for use in muon triggering and pattern recognition studies. The following are transparencies of a talk given at the Rocky Mountain Consortium Workshop in Boulder, Colorado on July 21, 1992.

TN-92-00194

09/24/92

On the Effects of Passive Absorber Before the Muon System

McNeil, R. R.

This document has not been received from the author.

TN-92-00195

09/23/92

Physics/Simulation Group Meeting - SSCL

Agenda, attendees and presentations of the GEM Physics/Simulation Group Meeting held at the SSC Laboratory on September 23, 1992. Agenda items are: Discussion of Physics Issues Related to Hadron Calorimeter; Critique of SDC TDR Physics Performance Section; Discussion of Topics and Responsibilities for GEM; and Plans for Simulation Tools -- e.g. FAST1+.

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Document Number Index w/Abstract

TN-92-00196

09/22/92

Noise, Pile-up, Linearity, and Rate Capability of a Hadronic Calorimeter

Paar, Hans Peter

Pulse shaping, signal filtering, and signal processing are not the exclusive domain of cryogenic liquid calorimeters. In the latter case, these features are requirements of the calorimeter electronics because of the long drift time relative to SSC's bunch crossing time. In a fiber calorimeter with photomultiplier (PM) readout, pulse shaping at the PM's output has advantages too although they have nothing to do with speeding up the calorimeter response. In fact shaping is already used unknowingly in conventional ADC systems when one does pedestal subtraction. We review pile-up noise and pulse shaping for fiber calorimeters and make a comparison between pile-up noise, thermal noise and their sum for a cryogenic liquid and a fiber hadronic calorimeter. We show that the fiber hadron can have at least a factor 3 less pile-up noise than the cryogenic hadron calorimeter if "adaptive filtering" works, otherwise it might be a factor 10 less.

TN-92-00197

09/28/92

Muon Energy Loss in the Hadron Calorimeter and Muon Momentum Resolution

Branson, James G.

Paar, Hans Peter

Muons can undergo catastrophic energy loss in a hadron calorimeter. This energy loss is mainly photoproduction of hadrons for the very catastrophic events. bremsstrahlung contributes at the lower energy losses. The measured energy loss in the calorimeter must be added to the muon momentum measured outside the calorimeter. A detailed GEANT simulation with energy resolution $\sigma / E = 50\% / \sqrt{E} + 2\%$, no depth segmentation, and light attenuation in the fibers take into account shows that the fiber hadron calorimeter does not contribute to the muon momentum resolution except for 100 GeV muons where its contribution is 1.1%. This is of the same magnitude as the momentum resolution at 100 GeV and does not significantly affect the mass resolution at the Z0 mass.

TN-92-00198

09/28/92

Monte Carlo Simulation for GEM Muon Chamber Trigger Rate

Yamashita, Akihiro

This document has not been received from the author.

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Document Number Index w/Abstract

TN-92-00199

09/28/92

The GEM Muon System Based on Cathode Strip Chambers

Beijing Institute for High Energy Physics
Boston University
Brookhaven National Laboratory
Draper Laboratory
Hofei University
Institute of Theoretical and Experimental Physics, Moscow
Joint Institute for Nuclear Research/Dubna
Minsk Institute of Nuclear Problems
Oak Ridge National Laboratory
Princeton University
St. Petersburg Nuclear Physics Institute
SSC Laboratory
State University of New York at Stony Brook
Tsinghua University
University of Houston

This document proposes to show that the Cathode Strip Chambers (CSC) Technology represents the best choice for the GEM muon system.

TN-92-00200

09/01/92

Selection of the GEM Electromagnetic Calorimeter Technology: Decision Memorandum

Barish, Barry
Willis, William

The GEM Collaboration has selected a sampling liquid krypton calorimeter as the preferred electromagnetic calorimeter technology for inclusion in the GEM Technical Design Report. This choice reflects the goal of the GEM Collaboration to construct a major detector for the SSC which emphasizes the physics discovery potential of gammas, electrons, and muon final states. We intend to exploit the maximum capability of the liquid krypton technique towards our goal of constructing a calorimeter with precise energy resolution and one which is robust against backgrounds.

Document is actually dated as September 1992.

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Document Number Index w/Abstract

TN-92-00201 Draft

10/02/92

The Design and Performance of Scintillator/Cherenkov Fiber Forward Calorimeter for GEM

Webb, Robert C.

The kinematic region beyond $\eta = 3$ at the Superconducting Super Collider (SSC) provide some special challenges for high performance calorimetry. In this region, hadron showers cover rather large regions η of and radiation levels beyond $\eta = 5.5$ near the beam pipe can exceed 10 to 9th power Rads per standard SSC year at luminosities of 10 to 34th cm⁻² sec⁻¹. However in order to access the physics processes with missing ET signatures, this kinematic region is of extreme importance.

In the note which follows, we will describe the design and performance of a fast, projective, rad hard scintillator/quartz fiber sampling calorimeter for the forward regions in the GEM experiment. This calorimeter should provide the energy and spatial resolution required for this missing ET physics while being robust enough to survive ten years of operation at a nominal luminosity of 10 to 33rd.

TN-92-00202

10/02/92

New Approach to Muon System Alignment

Mitselmakher, G.
Ostapchuk, A.

New approach to the GEM muon system alignment is proposed. Projective straightness monitors readings completed with suitable interpolation procedures are used for correction of high momentum muon sagitta.

TN-92-00203

10/02/92

Limited Streamer Drift Tubes for the GEM Muon System

Busza, W.
Kelsey, J.
Kendall, H. W.
Korytov, A.
McNeil, R. R.
Metcalf, W.
Osborne, L. S.
Rosenson, Larry
Ross, G. D.
Sumner, Richard
Taylor, Frank E.
Verdier, R.
Wadsworth, B.

A review of the Limited Streamer Drift Tube (LSDT) technology option for the GEM muon system.

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Document Number Index w/Abstract

TN-92-00204

10/01/92

Texas Test Rig Safety Evaluation Supporting Documents

Guthrie, Richard

Price, Chad

This document supplements the safety evaluation for the Texas Test Rig (TTR) Laboratory. Its primary function is to give additional information on the mitigation of identified hazards and contribute additional insight into the overall safety of the TTR and its operation. It is provided as supporting documentation to GEM TN-92-151, Texas Test Rig Laboratory Safety Evaluation.

TN-92-00205

10/01/92

Muon Tracking System for the GEM Detector Using Pressurized Drift Tubes

Bromberg, C.

The MSU group in collaboration with the Dubna group and other institutions from the CIS propose that the GEM collaboration adopt Pressurized Drift Tubes (PDT) for the GEM Muon Detector. The Dubna group and the MSU group each have constructed a PDT prototype chamber and delivered them to the SSC for evaluation in the TTR. The design which is discussed here and detailed in the Design Report, attached as Appendix A, is based largely on the MSU prototype but design options from the Dubna detector which can be usefully incorporated, such as integrated and shielded electronics, are noted and are being discussed within our collaboration.

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TN-92-00206 Rev. A

10/06/92

Resistive Plate Chamber Technology Review

Ables, E.
Alyea, E. D.
Berridge, S.
Bionta, R. M.
Bugg, W.
Chang, Yuan-Hann
Chen, D.
Du, P. Y. C.
Hafen, E. S.
Haridas, P.
Haro, M.
Lee, M.
Makowiecki, D. M.
Mauger, G. Joseph
McKernan, M.
Miller, K.
Pless, I. A.
Ramsey, P.
Santonico, R.
Widgoff, M.
Wuest, Craig R.
Yunus, S.

A review of the resistive plate chamber technology option for the GEM muon system.

TN-92-00207 Draft

10/01/92

Mechanical Engineering Evaluation of the Muon Chamber Technology Options

Gamble, M.
Humphreys, R.
Johnson, Coleman
Nimblett, F.
Sawicki, Richard

This report summarizes an engineering evaluation of the technologies that are being proposed for the barrel muon subsystem of the GEM detector. A summary of the status of each option is presented along with a comparison of the relative strengths and weaknesses of each design.

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Document Number Index w/Abstract

TN-92-00208

10/06/92

Compensation, Resolution, Linearity, and the GEM Hadron Calorimeter Decision

Carey, R.
Worstell, William A.

We have performed Monte Carlo studies comparing the response to jets of a Liquid Krypton EM/Scintillating Fiber hadron calorimeter (hybrid) and a Liquid Krypton EM/Liquid Krypton hadron calorimeter (integrated). The starting point for these studies was the observation that unlike the lead/liquid Argon hadron calorimeter studied in the BNL test beam in 1991, the hadron calorimeter proposed for the integrated option has a copper absorber. This leads to a much less compensated response between electrons and hadrons, and consequently a larger constant term for jet energy resolution. Using optimistic assumptions about this untested device ($e/h = 1.6$, 75% / \sqrt{E} stochastic term) and a simple fragmentation function, our model predicts a constant term of at least 2% - 3% in jet energy resolution due to this lack of compensation for the integrated device. The hybrid option shows less than 1% constant term due to this effect, and unlike the integrated option its response can be predicted without requiring knowledge of details of the fragmentation function at high energies; the latter point was discussed in detail in GEM Technical Note 92-67 by H. Paar and R. Wigmans. We have extended the work of Paar and Wigmans to include the current integrated design, and have found more than 1% variation in the nonlinearity of response for the integrated device with a relatively small change in the jet fragmentation function.

TN-92-00209

10/06/92

Re-Comparing Forward Calorimetry Technologies

Winn, D. R.
Sulak, L. R.
Worstell, William A.
Paar, Hans Peter

We discuss forward calorimetry technology choices. We demonstrate that optical fiber technologies are capable systems for Forward Calorimetry, with many superior properties to alternatives. Furthermore, they are in advanced states of R&D compared with other techniques, with broad-based international support, with both hadron and e-m modules constructed and tested, as contrasted with Tubular LArgon.

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Document Number Index w/Abstract

TN-92-00210

10/07/92

Preliminary Beam Test Results of the GEM Copper/Scintillating Fiber Hadron Calorimeter Prototype

Carey, R.
Kroeger, R.
Miller, J. P.
Moore, B.
Paar, Hans Peter
Reidy, Jim
Sulak, L. R.
Worstell, William A.

In July 1992 the SSCintCAL collaboration tested 7 prototype projective hadron calorimeter towers (total mass = 5T) in the BNL A3 test beam. Each tower was constructed with scintillating fibers embedded between copper laminations. We obtained a fitted energy resolution of $91\% / \sqrt{E}$ for 10 GeV pions, before any corrections for lateral shower containment. We have also not corrected for fiber attenuation effects, which were significant with our unmirrored (due to time constraints) fibers; this effect is much smaller for jets than for single hadrons. Pions exhibit uniform response when scanned across boundaries between modules and when scanned through a range of incident angles with respect to the fibers. Our measured e/π ratio is $1.08 \pm .02$ before leakage corrections, for pion energies between 10 and 20 GeV. For muons, we observed Landau distributions well-resolved from pedestals for an incident angle of 1.5 degrees with respect to horizontal planes of fibers and 0 degrees with respect to vertical planes of fibers.

TN-92-00211

09/22/92

Simulation of the EM Response of a Quartz Fiber Calorimeter

Dye, S. T.

Document has not been received from the author.

TN-92-00212

11/11/92

Preliminary GEANT Simulation Results on the Forward Quartz-Fiber Calorimeter

Carey, R.
Dye, S. T.
Miller, J. P.
Winn, D. R.

Preliminary simulation results on the performance of a quartz fiber/lead (tungsten) calorimeter, a candidate technology in the GEM detector's forward region, are presented. Results suggest that the design is promising and may be appropriate for the physics at very large $|\eta|$.

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TN-92-00213

09/21/92

Report of the Task Force on a Hybrid Calorimeter

Efremenko, Yury

Ma, Hong

Mockett, Paul M.

Savin, Alexandre

Shi, Xiaorong

Shmakov, Konstantine

Stumer, Iuliu

Womersley, J.

Worstell, William A.

The task force was convened to address the option of building the GEM barrel calorimeter with a three layer structure: Liquid Krypton EM section; Liquid Argon hadronic section, thickness "a few" absorption lengths (we assume 0-3); and SPACAL hadronic section. The issues to be addressed in the geometry were its performance for: EM energy measurement, and leakage; electron-pion discrimination; missing ET measurements; and jet energy resolution. All as a function of varying the thickness of the liquid argon hadronic layer from zero to 3λ . The control for comparison purposes was the baseline 1, all-liquid-argon option.

TN-92-00214

10/01/92

Selection of the GEM Hadronic Calorimeter Technology: Decision Memorandum

Barish, Barry

Willis, William

The GEM Collaboration has selected a hybrid calorimeter (liquid krypton/scintillator) as the preferred technology for inclusion in the GEM Technical Design Report. This choice reflects our goal to develop a major detector for the SSC optimized for physics discovery with gamma, electron, and muon final state signatures and with important abilities for missing ET and high luminosity. We intend to optimize the use of this dual technology calorimeter.

The document is actually dated October 1992.

TN-92-00215

10/01/92

Higgs into 2 Electrons and 2 Muons via Z - Z Decay at High Luminosity (1034), for an 800 GeV Higgs - ($H^0 \rightarrow Z^0 Z^0 \rightarrow e^+ e^- \mu^+ \mu^-$ (MH = 800 GeV) at $\mathcal{L}=10$ to 34th Power $\text{cm}^{-2}\text{s}^{-1}$)

Antos, Jaroslav

Strategy for 800 GeV Higgs hunting at GEM is presented.

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Document Number Index w/Abstract

TN-92-00216

10/08/92

Collaboration Council Meeting - SSCL

Agenda, attendees, and presentations of the GEM Collaboration Council Meeting held at the SSC Laboratory on October 8, 1992. Agenda items are: GEM News; Statement by Incoming Council Chair; Project Manager's Report; Calorimetry Decisions and Plans; Muon Decisions; and Tracker Status and Progress Toward TDR.

TN-92-00217

10/21/92

Neutron Task Force Meeting - SSCL

Agenda, attendees, and presentations of the first GEM Neutron Task Force Meeting held at the SSC Laboratory on October 21, 1992. Agenda items are: Status of Simulations and Neutron Fluences; Verification of Simulations; Discussion of Neutrons Sources and Mitigation; Shielding Strategies; Chamber Sensitivity and Lifetime; And What About Gammas?; and Plans for Work and Next Meeting.

TN-92-00218

10/06/92

Muon System Review Meeting - SSCL

Agenda, attendees, and presentations of the GEM Muon System Review Meeting held at the SSC Laboratory on October 6, 1992. Agenda items are: General Remarks; PDT Presentation - Discussion; PDT-JINR; LSDT Presentation - Discussion; CSC Presentation - Discussion; RPC Presentation - Discussion; Engineering Assessment Report; Electronics Cost Comparison Report; and External Comments and Discussion.

TN-92-00219

10/22/92

Vessel Random Vibration Analysis

House, F. A.

An analysis of the GEM vacuum vessel subject to estimated random ground motion has been completed.

TN-92-00220

10/22/92

SSCintCal Meeting - SSCL

Reidy, Jim

Agenda and presentations of the GEM SSCintCal Meeting held at the SSC Laboratory on October 22 and 23, 1992. Agenda items are: Overview of SSCintCal; Report from Bill Willis' Committee; SSCintCal R&D Goals for Next Year; Institutional Responsibilities; Discussion with Bill Willis; Institutional Responsibilities Continued; Discussion of Engineering Responsibilities; Discussion of GEM-Calorimeter Optimization; Simulation Results; and Future Plans for Simulation.

Actual dates of the meeting were October 22 and 23, 1992. The listed author is the editor.

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Document Number Index w/Abstract

TN-92-00221

10/26/92

Some Considerations and Evaluations on the Mass-Production of GEM Muon Detectors for Barrel Part

Chen, Yuan-bo
Guo, Ya-nan
Xie, Yi-gang

After investigating into GEM muon detectors, the comprehension and comparison to some candidates of the barrel part (LSDT, CSC, PDT, RPC) are summarized. Some concerns, considerations, fabrication procedures and cost evaluations relating to their mass-production are described.

TN-92-00222

10/29/92

GEM Magnet Safety Evaluation

Guthrie, Richard
Price, Chad

This document has not been received from the author.

TN-92-00223

10/28/92

Muon Stiffness Calculations for CSC Chambers

Johnson, Coleman

Deflection calculations for CSC MUON chambers show more than adequate stiffness for GEM.

TN-92-00224

10/12/92

Structural Analysis of the GEM Central Detector Support

Smith, Brian G.
Stevens, R. Robert

This report describes the structural analysis of the central detector support for the GEM detector. The concept is a segmented double membrane which supports the calorimeters and central tracker inside the solenoid magnet. The main issues to be addressed in this report are whether the central detector support can act independently from the magnet halves and whether longitudinal stiffening is needed in the form of gussets or spokes to stabilize the structure during operational and maintenance periods. Fabrication techniques, cost, schedule, central detector assembly procedures, and central detector alignment precision are not considered to be within the scope of this report.

TN-92-00225

Not Assigned

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Document Number Index w/Abstract

TN-92-00226

10/20/92

Physics Simulation Group Meeting - SSCL

Agenda, attendees, and presentations of the GEM Physics Simulation Group Meeting held at the SSC Laboratory on October 20, 1992.

TN-92-00227

11/03/92

Monte Carlo Simulation of Timing Resolution of CSC's in the GEM Muon Barrel

Lau, Kwong

The timing resolution of cathode strip chambers (CSC's) in the GEM muon barrel is studied by monte carlo simulation for two designs, one with 4 layers of 0.5 cm x 0.5 cm cells and another with 8 layers of 1.0 cm x 1.0 cm cells. It is found that for both designs, less than 2% of the tracks have a drift distance over 1.6 mm, which corresponds to a drift time of less than 16 ns for a gas of drift speed in excess of 100 mm / μ s near the anode wire. These results are obtained for specific staggering schemes and averaged over the entire barrel angular region. The staggering scheme has not yet been optimized.

TN-92-00228

11/10/92

Test of GEM Alignment Scheme with Cathode Strip Chambers and X-Ray Source

Ostapchuk, A.
Schegelsky, V.

Study of projective alignment scheme with the test bench, containing three modules of cathode strip chambers and X-ray source, is proposed.

TN-92-00229

10/07/92

Physics Simulation Group Meeting - SSCL

Agenda, attendees, and presentations of the GEM Physics Simulation Group Meeting held at the SSC Laboratory on October 7, 1992.

TN-92-00230

11/16/92

GEM Calibration Hall Safety Evaluation

Guthrie, Richard
Woolley, Ronn P.

This document has not been received from the author.

TN-92-00231

Progress Report on the GEM Detector Baseline Design

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TN-92-00232

09/23/92

Calculation Method for GEM Vessel Random Vibration Study

House, F. A.

Computer analysis of the GEM vacuum vessel subject to random vibration from the experimental hall floor has been accomplished. This paper documents the method used. The results were reported in a separated document entitled "Vessel Random Vibration Analysis", GEM-TN-92-219.

TN-92-00233

11/17/92

Neutron Task Force Meeting - SSCL

Attendees and presentations of the GEM Neutron Task Force Meeting held at the SSC Laboratory on November 17, 1992.

TN-92-00234 Rev. D

11/23/92

GEM Magnet Subsystem Specification

Bowers, Joel

Deis, G. A.

Johnson, Robert

Marston, P. G.

Martovetsky, N. N.

Minervini, Joe

Oberst, G.

Parlier, Lynn

Pedrotti, L.

Reardon, Paul

Smith, Bradford

Stroynowski, Ryszard

Warren, R.

Wisniewski, W. J.

Yamamoto, Robert

This document contains the top-level technical specification for the GEM Magnet Subsystem. These specifications define the required performance of the magnet and serve as the ultimate basis upon which the magnet is designed.

TN-92-00235

11/18/92

Dynamic Range of the GEM Calorimetry

Prebys, Eric

A Monte Carlo study has been performed to investigate the required dynamic range for both the electromagnetic and hadronic calorimetry of the GEM experiment. For both systems, the lower end of the range was taken to be the total thermal and pileup noise. In the case of the electromagnetic calorimetry, the upper end of the range has been determined from $Z' \rightarrow e+e-$ decays. For the calorimeter, high-pt two-jet events have been used.

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- TN-92-00236 11/23/92
First Studies of GEM Baseline II Calorimetry From Arizona Mixture Level Simulation (UAZMIX)
Shupe, Michael A.
The first results from the mixture level GEANT simulations of the GEM Baseline II design are presented.. The following items are included: 1) Longitudinal slice view of simulated baseline; 2) Representative event pictures; 3) Analysis of pion energy scan at $\eta=0$; 4) Diplots of η scans for 200 GeV/c pion; 5) Diplots of η scans for 50 GeV/c electron; and 6) Views of forward calorimeter options being run now for analysis.
- TN-92-00237 11/05/92
Central Tracker Meeting - Brookhaven National Laboratory
Agenda and presentations of the GEM Central Tracker Meeting held at Brookhaven National Laboratory on November 5, 1992.
- TN-92-00238 11/03/92
Collaboration Council Meeting - Brookhaven National Laboratory
Agenda and presentations of the GEM Collaboration Council Meeting held at Brookhaven National Laboratory on November 3-6, 1992.
Actual dates are November 3-6, 1992.
- TN-92-00239 11/05/92
Electronics Meeting - Brookhaven National Laboratory
Shaevitz, M.
Marlow, Daniel
Agenda and presentations of the GEM Electronics Subgroup Meeting held at Brookhaven National Laboratory on November 5, 1992.
The authors listed for this document are the session chairs.
- TN-92-00240 11/05/92
Calorimeter Engineering Review Meeting - Brookhaven National Laboratory
Agenda, attendees and presentations of the GEM Calorimeter Engineering Review Meeting held at Brookhaven National Laboratory on November 5, 1992.
- TN-92-00241 11/05/92
Muon Meeting - Brookhaven National Laboratory
Agenda, attendees and presentations of the GEM Muon Meeting held at Brookhaven National Laboratory on November 5, 1992.

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TN-92-00242

11/19/92

Muon Technology Meeting - Duncanville, Texas

Agenda, attendees and presentations of the GEM Muon Technology Meeting held at the Holiday Inn in Duncanville, Texas on November 19, 1992.

TN-92-00243

12/03/92

Simulation of Various GEM Forward Calorimeter Options Using a Mixture Level Description of the Detector

Shupe, Michael A.

Seven representative forward calorimeter options for GEM are simulated in order to map out the behavior of the P and Pt response function for different placements and various beam hole sizes.

TN-92-00244

12/03/92

PAC Review Meeting - SSCL

GEM Collaboration presentations to the PAC at the PAC Review Meeting held at the SSC Laboratory on December 3, 1992.

TN-92-00245

11/18/92

Muon System Alignment Meeting - SSCL

Agenda, attendees, and presentations of the GEM Muon System Alignment Meeting held at the SSC Laboratory on November 18, 1992.

TN-92-00246

12/07/92

Studies of Multi-Track Resolution in the Interpolating Pad Chambers of the GEM Tracker

Thomas, Jennifer

The coordinate finding and resolution of the Interpolating Pad Chambers proposed for the GEM tracker have been studied using a simulation program written by V. Cherniatin and A. Chikanian. The program incorporates data collected using Cathode Strip Chambers running in CF₄CO₂ gas. Three methods have been studied for coordinate determination, one using a Gaussian fit approach, one using the center of gravity of the charge deposition and the third using the function from Mathieson1. The best results for single coordinate finding are achieved with the Mathieson function and similar results are obtained with the gaussian method. The latter was used to study the two track resolution as a function of distance between tracks which was found to be degraded by at worst a factor 3 at a separation of about 1.5 pad widths and to reach a limit at about 0.2 pad widths separation. When two tracks were closer together than this, they could no longer be resolved. In addition, the case of three tracks was studied, and although it is not possible to reconstruct three tracks on the same pad, the average total charge per layer can be used effectively enough to recognize them, and three tracks on two pads can be resolved.

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TN-92-00247

10/26/92

Study of Pad Chamber Performance

Chen, Yen-Chu
Huang, Melin
Sumarokov, Alexei

A simplified pad chamber geometry with a width 2.5 mm along the anode wire direction is used to study the pad chamber performance. From this study, we found that 40 μm hit position resolution and 1.8 c/TeV momentum resolution are achievable when signal/noise ratio is 200 and luminosity is 10 to 34th cm^{-2} sec-1.

TN-92-00248

12/11/92

Calorimeter Programmable Level-1 Trigger: 1250 Trigger Tower: 3D-Flow System Assembly

Crosetto, D.

This document has not been received from the author.

TN-92-00249

12/08/92

Central Tracker IPC Test Beam Planning Meeting - Duncanville

Agenda, attendees, and presentations of the GEM Central Tracker IPC Test Beam Planning Meeting held at the Holiday Inn in Duncanville, Texas on December 12, 1992.

TN-92-00250

12/10/92

Cathode Strip Chambers Group Meeting - SSCL

Agenda, attendees, and presentations of the GEM CSC Group Meeting held at the SSC Laboratory on December 10, 1992.

TN-92-00251

12/10/92

Collaboration Council Meeting - SSCL

Agenda and presentations of the GEM Collaboration Council Meeting held at the Holiday Inn in Duncanville, Texas on December 10, 1992.

TN-92-00252

12/02/92

Report of the Superconducting Super Collider Program Advisory Committee

Report from the PAC on the operations of the SSC Laboratory. Included is a discussion of Test Beams; Neutron Background; GEM Detector; SDC Detector; and an agenda.

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Document Number Index w/Abstract

TN-92-00253

12/06/92

Review of Major SSC Experiments

The requirements for the review process of a major SSC experiment are stated. In addition, the schedule for the GEM Detector review is given.

TN-92-00254

09/22/92

A Summary of Radiation Damage Studies in Barium Fluoride from the GEM Collaboration

Woody, Craig L.

A summary is given of the radiation damage studies in BaF₂ carried out by the GEM Collaboration.. Data are presented on the effects of radiation from low energy gamma rays, energetic neutrons and high energy hadrons. Results are given from various analytical techniques used to study crystal purity and structure, and the present understanding of the principle causes of damage is discussed. A brief summary is also given of the conclusions of an Expert Panel which reviewed the situation of radiation damage in BaF₂ for the GEM experiment.

TN-92-00255

12/16/92

Electronics Engineering Meeting

Agenda, attendees, and presentations of the GEM Electronics Engineering Meeting held at Princeton University on December 16 & 17, 1992.

TN-92-00256

12/24/92

Calorimeter Newsletter #4

Willis, William
Wisniewski, W. J.

The Calorimeter Newsletter contains contributions from different areas of calorimeter work.

TN-92-00257

11/22/92

Optimization of Accordion EM Calorimeter in GEM

Leltchouk, M.
Ma, Hong

This document has not been received from the author.