Fermilab STI

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OSTI-HEP Roundtable

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STI Types at Fermilab

Fermilab has three kinds of STI (either **public** or **internal**)

- Papers
 - Journal article, conference papers, theses, technical memos
- Software
 - The common frameworks etc. that we provide to the community
 - The experiments' proprietary reconstruction and analysis software
- Data
 - Raw
 - Simulation (Level 4)
 - Analysis (Level 3)
 - Reconstruction (Level 2)
 - Published (Level 1)

Papers: Review and Release

- Well-controlled Review and Release system run by Technical Publications Office (TPO) and Directorate
- Scientists receive awareness training on their responsibilities for paper submission and copyright forms
- Papers are submitted to TPO by authors
- All papers are reviewed by Export Control and Patent teams
 - Based on abstract submission
 - Request full-text if necessary
 - Typically 1-day turn-around
- Technical review
 - Done internally by large collaborations and theorists
 - Done by Directorate-assigned reviewers for other papers
- Paper then ready for release

Papers: Entered into INSPIRE database

Welcome to [INSPIRE](#), the High Energy Physics information system. Please direct questions, comments or concerns to feedback@inspirehep.net.

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HEP Search

High-Energy Physics Literature Database

Use "find " for SPIRES-style search ([other tips](#))

Brief format ▼

Search

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How to Search

SPIRES syntax is (mostly) supported (requires "find")

- [find a richter, b and t quark and date > 1984](#)
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RESOURCES

Papers: INSPIRE

- Publicly available High Energy Physics database suite run by CERN, DESY, Fermilab, IHEP and SLAC to serve the world-wide HEP community
- All Fermilab papers are entered there
- INSPIRE has feed from arXiv.org and publishers for HEP-related papers
- Records include detailed metadata
 - Authors
 - Affiliations, ORCIDs, Emails addresses
 - Titles, Experiments, Conference, References, etc.
- Can search INSPIRE to find Fermilab papers not sent to TPO, also OSTI's very helpful Web of Science report
 - Write to authors asking them to submit paper

A Fermilab paper in INSPIRE

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Information References (32) Citations (3) Files Plots

Noise Characterization and Filtering in the MicroBooNE Liquid Argon TPC

MicroBooNE Collaboration (R. Acciarri (Fermilab) et al.) [Show all 154 authors](#)

May 20, 2017 - 36 pages

JINST 12 (2017) no.08, P08003

(2017-08-04)

DOI: [10.1088/1748-0221/12/08/P08003](https://doi.org/10.1088/1748-0221/12/08/P08003)

FERMILAB-PUB-17-163-ND

e-Print: [arXiv:1705.07341](https://arxiv.org/abs/1705.07341) [physics.ins-det] | [PDF](#)

Experiment: [FNAL-E-0974](#)

Abstract (IOP)

The low-noise operation of readout electronics in a liquid argon time projection chamber (LArTPC) is critical to properly extract the distribution of ionization charge deposited on the wire planes of the TPC, especially for the induction planes. This paper describes the characteristics and mitigation of the observed noise in the MicroBooNE detector. The MicroBooNE's single-phase LArTPC comprises two induction planes and one collection sense wire plane with a total of 8256 wires. Current induced on each TPC wire is amplified and shaped by custom low-power, low-noise ASICs immersed in the liquid argon. The digitization of the signal waveform occurs outside the cryostat. Using data from the first year of MicroBooNE operations, several excess noise sources in the TPC were identified and mitigated. The residual equivalent noise charge (ENC) after noise filtering varies with wire length and is found to be below 400 electrons for the longest wires (4.7 m). The response is consistent with the cold electronics design expectations and is found to be stable with time and uniform over the functioning channels. This noise level is significantly lower than previous experiments utilizing warm front-end electronics.

[Abstract \(arXiv\)](#)

Note: 36 pages, 20 figures

Keyword(s): INSPIRE: [time projection chamber](#) | [liquid argon](#) | [wire: length](#) | [electronics: readout](#) | [electronics: design](#) | [current: induced](#) | [noise](#) | [integrated circuit](#) | [BooNE](#)

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Fermilab papers in INSPIRE

- Automatically shared with the public and HEP community in particular by including papers in INSPIRE
- Can use INSPIRE back-end tools to push records to OSTI as xml metadata using Web Services
- Feeds from publishers of journal articles are matched to preprints
- We then know a paper has been published and can ask authors for accepted manuscript
 - Some collaborations have rules to replace eprint at arXiv.org with final version accepted by publisher

INSPIRE - HEPDATA

- Unique open-access repository for scattering data from more than 8,500 experimental HEP papers.
- “Level 1” according to **DPHEP** classification [arXiv:1205.4667], e.g. numbers for final data points plotted in publications.
- DOIs minted for whole record and each table via **DataCite**
- Based in Institute for Particle Physics Phenomenology (IPPP) at Durham University (UK), going back to 1970s.
- Recent transition to hepdata.net site, hosted at CERN.
- Funded by UK Science & Technology Facilities Council (STFC). Current grant to support two staff until 2019.
- Becoming fully integrated with INSPIRE

HEPDATA – INSPIRE MINERvA Collaboration

HEPDATA – click on “table”

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Table 1 from Marshall, C.M. et al.

Hide Publication Information

Measurement of K^+ production in charged-current ν_μ interactions

Phys.Rev. D94 (2016) 012002

MINERvA

DOIView paper in InspireView old HepData

Abstract (data abstract)
Numbers taken from tables 1, 5, 6, 7, 8. of arXiv:1604.03920v3.

Table 110.17182/hepdata.78539.v1/t1

<http://www.hepdata.net/record/hepdata.78539.v1/t1>

The predicted ν_μ flux per POT for the data included in this analysis.

observables

FLUX

reactions

NUMU CH --> MU- K+ X

RE	NUMU CH --> MU- K+ X
E_ν [GeV]	Flux ($10^{-9} \nu_\mu / \text{cm}^2 / \text{POT}$)
0 - 1	1.0331
1 - 2	4.3611
2 - 3	7.4333
3 - 4	7.9013
4 - 5	3.2984
5 - 6	1.2193

Visualize

watt_hepdata_nov....pdf

Show all

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Common S/W for Intensity Frontier Experiments

- **FNAL is realizing a big payoff for a big investment**
- art: an event processing framework
- LArSoft:
 - Common code for sim & reco of LAr based v experiments
 - A collaboration to develop the same
- Tools for:
 - Job submission, monitoring and management
 - Same interface for OSG, various clouds and HPC!
 - Data cataloging and handling
 - Build and distribution management
- Shares DNA and some code with similar CMS resources
- Not really public or private
 - **Semi-public** is a better description

Semi-public

- Codes stored in world readable repositories
 - A variety of different licenses
- Expert domain knowledge needed for use
- Much usable only with authentication/authorization to
 - Access private data sets
 - Access HTC or HPC resources
- Large underlying software stack – requires coherent builds.
- Limited support
 - FNAL user community supported
 - Limited hardware/OS/compiler combinations
- Some issues with proper attribution of important contributions to semi-public codes; under discussion in the community.

Other Software

- Code bases of individual experiments
 - Sim, reco, calibration:
 - Traditionally private
 - Now usually semi-public
 - Analysis code private, at least until publication
- Codes for control and monitoring of one-off equipment
 - Usually private
- FNAL has little truly public software.
- Software we use but do not control:
 - Event generators
 - ROOT, Geant4, GeantV
 - These have many different license arrangements