March 1997
FERMILAB-PROPOSAL-0885

E-885 (Kron) Sloan Digital Sky Survey

Fermilab
(and Chicago, Inst. for Adv. Study, Japan Promotion Group (Japan), Johns Hopkins, Princeton, US Naval Observatory, Washington)

Status: *No Data Yet*

The Sloan Digital Sky Survey (SDSS) intends to reveal large-scale structure in the distribution of galaxies with a spatial extent, and precision in its determination, that greatly exceed current capabilities. This map of the large-scale distribution of galaxies will serve to constrain models for the origin and evolution of that structure, and thereby to address fundamental questions in cosmology and astrophysics, including the amount and distribution of mass with respect to the luminous material in the Universe.

To achieve these goals, one million redshifts are to be obtained to a uniform flux limit of galaxies within a solid angle of pi steradians, away from the obscuring disk of the Milky Way. The need for a uniform and well-calibrated flux limit requires a new imaging survey to be conducted, from which the spectroscopic (redshift) target list will be derived. This imaging survey yields a two-dimensional map of the same region, which itself will provide new cosmological information since the detection threshold of the imaging survey is much fainter than that of the spectroscopic survey. A wide-field 2.5-m telescope (see adjacent figure) dedicated to this project will soon be undergoing commissioning tests at Apache Point Observatory, near Sunspot, New Mexico. The imaging system and the spectroscopic system share the same focal plane via an instrument exchange mechanism (see Figures 1 and 2). The unique data products include the multi-band imaging survey (there are 5 wave bands covering the visible spectral range, the data from which are collected nearly simultaneously), and the inclusion of quasar candidates along with the galaxies.

Fermilab role:

The project will produce at least 10 Terabytes of data in five years of operation (each long, clear night will yield 200 GBy of raw data). It is Fermilab's primary responsibility on this project to handle this volume of data. The implementation of the end-to-end data system has been assigned to Fermilab. This includes design and construction of the data acquisition system (on the mountaintop at Apache Point), and the specification and responsibility for the production system (in the Feynman Computing Center at Fermilab). The scientific coding is being undertaken by scientists at the participating institutions (including Fermilab). The design and implementation of the code management system, the promulgation of standards, and the computing framework in which the scientific code runs, are also Fermilab's responsibility.

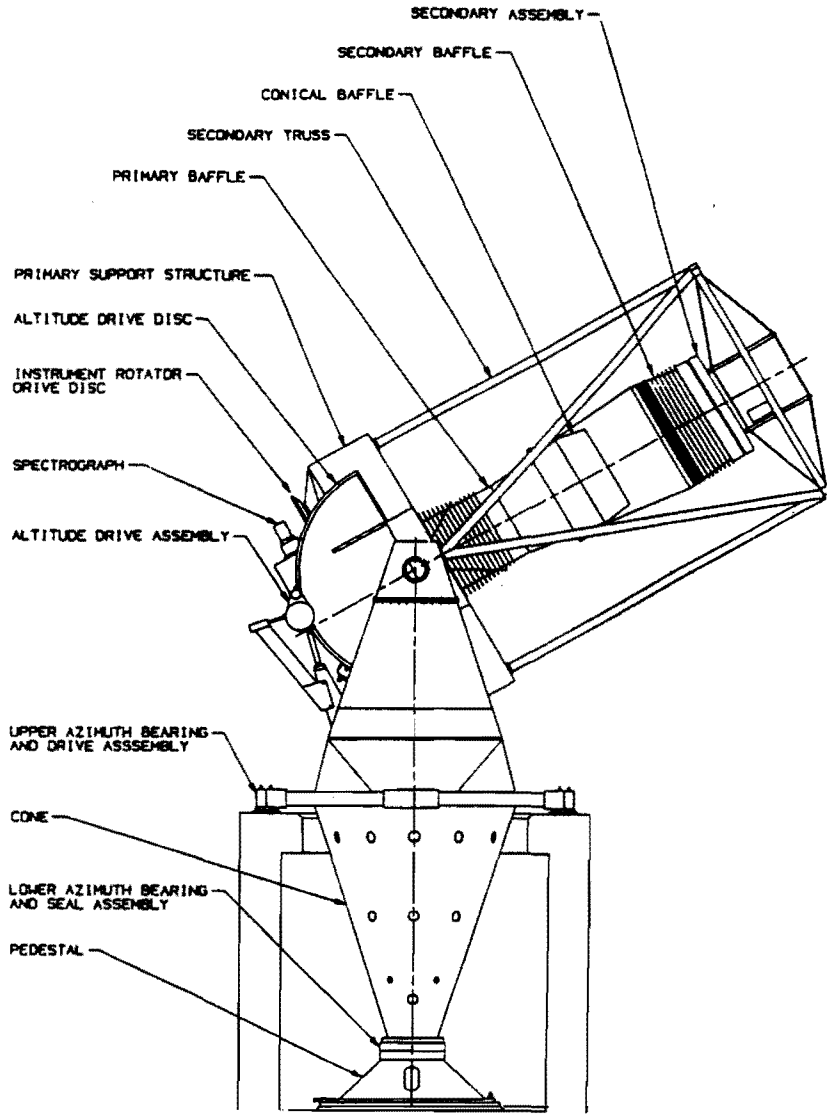
In addition to the computing infrastructure, Fermilab has also been an active contributor to a number of other aspects of the project, including development of the Monitor Telescope subsystem; development of a device that maps which optical fiber is plugged into which location on the focal-plane plate; implementation of the telescope control system; design and implementation of the interlocks system; and the specification of auxiliary mechanical handling fixtures.

Management:

The Apache Point Observatory is managed by the Astrophysical Research Consortium (ARC), a group of universities originally constituted to build and operate a 3.5-meter telescope. The SDSS represents the second major telescope and project at the same site. The ARC Board oversees ARC's activities and budget. Each of the two telescope projects has its own Director, who reports to the Board on the expenditures. The SDSS has an Advisory Council to the ARC Board that oversees SDSS project activities and budget. There are three non-ARC members of the SDSS project: Fermilab, the U.S. Naval Observatory, and the Japan Promotion Group (a collaboration of several Japanese academic institutions).

The SDSS Project Director is D. G. York of The University of Chicago. The Survey Director is R. G. Kron of the Experimental Astrophysics Group at Fermilab. The Computing Coordinator is S. Kent, also of the Fermilab Experimental Astrophysics Group.

E-885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SECONDARY TRUSS
PRIMARY BAFFLE
PRIMARY SUPPORT STRUCTURE
ALTITUDE DRIVE DISC
INSTRUMENT ROTATOR DRIVE DISC
SPECTROGRAPH
ALTITUDE DRIVE ASSEMBLY
UPPER AZIMUTH BEARING AND DRIVE ASSSEMBLY
CONE
LOWER AZIMUTH BEARING AND SEAL ASSEMBLY
PEDESTAL

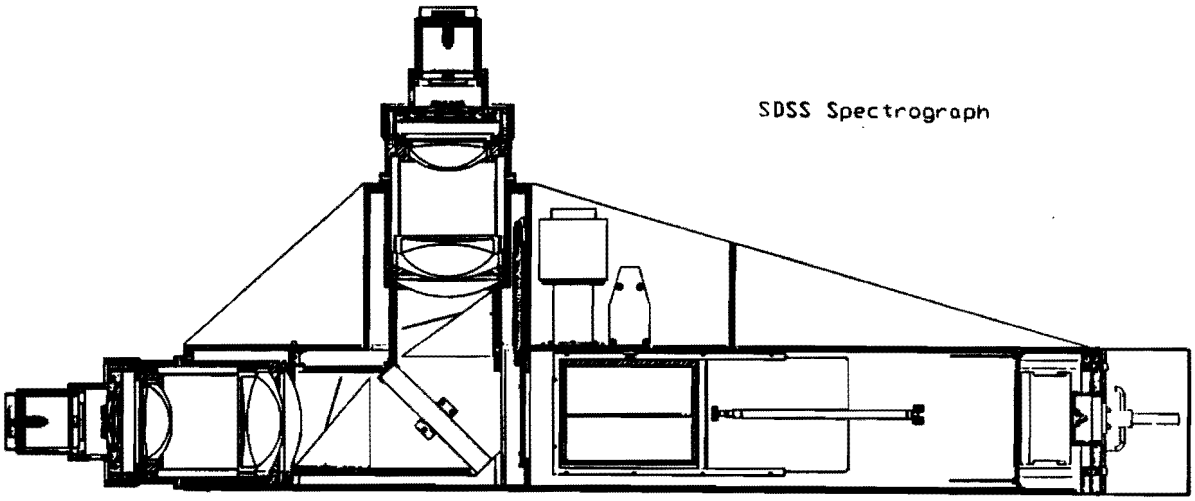

Figure 1

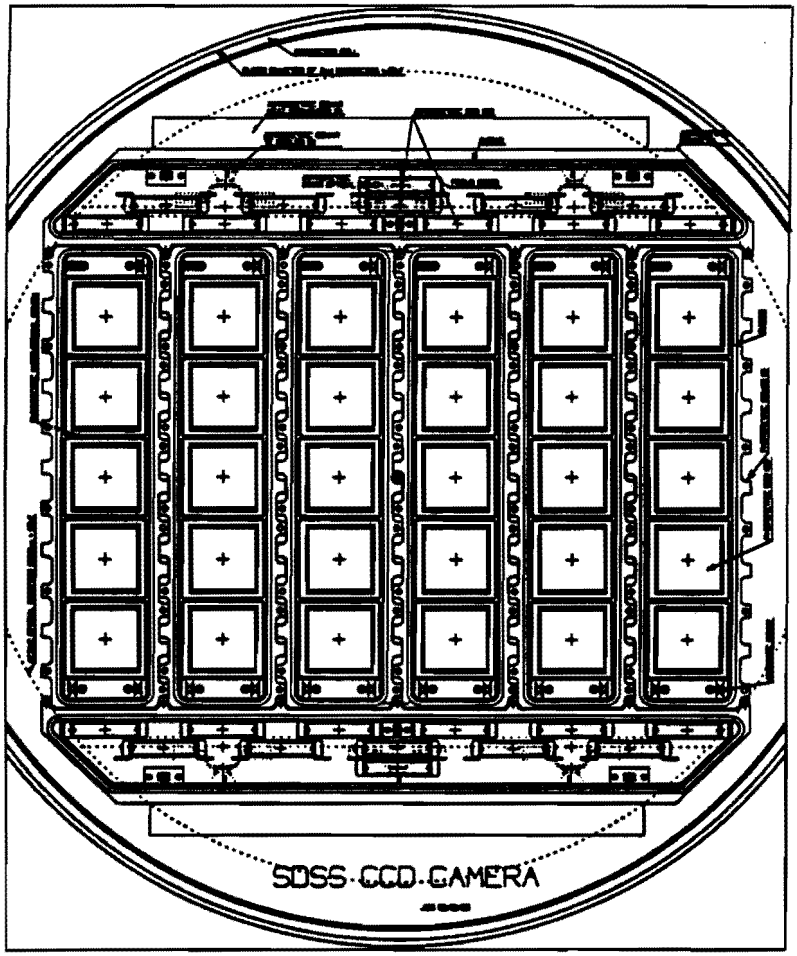

Figure 2

#	885
Title	Sloan Digital Sky Survey
Short Title	Sloan Digital Sky Survey
Spokesperson(s)	Kron, Richard G.
Status	Approved
Beamline	Other
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