Astrophysical Research Consortium
Sloan Digital Sky Survey (SDSS) Advisory Council

Minutes of October 1, 2003 Meeting
Chicago O'Hare Hilton

(sdss-general version, excl. executive sessions)

OPEN SESSION

TIME AND ATTENDEES

The meeting convened at 8:30 am and adjourned at 4:00 pm CDT.

Council members present and their institutions were: Suzanne Hawley from University of Washington; Allen Sinisgalli and Scott Tremaine from Princeton University; Theodore Poehler and Timothy Heckman from Johns Hopkins University; Kenneth Stanfield from Fermilab; Jeffrey Pier from US Naval Observatory; Rene Walterbos from New Mexico State University; *Takashi Ichikawa* from the Japan Participation Group; and David Turnshek from the University of Pittsburgh.

Council members unable to attend the meeting were: Ron Irving from University of Washington; Robert Fefferman and Michael Turner from University of Chicago; Allen Rowe and John Bahcall from Institute for Advanced Study; *Yasushi Suto* from Japan Participation Group; Kenneth Johnston from US Naval Observatory; Rocky Kolb from Fermilab; Simon White from Max Planck Institute for Astrophysics; Hans-Walter Rix from Max Planck Institute for Astronomy; William Press from Los Alamos National Laboratory; and David Jasnow from University of Pittsburgh.

Josh Frieman from University of Chicago was an alternate for Michael Turner and had a proxy enabling *him* to vote for Fefferman. Scott Dodelson from Fermilab was an alternate for Kolb. Hawley had a proxy for Irving. Pier had a proxy for Johnston. *Ichikawa* had a proxy for Suto.

At the Council's request/invitation, certain guests were present for all of the meeting conducted in open session. They were: Rich Kron, SDSS Director; William Boroski, SDSS Project Manager; Bruce Gillespie, APO Site Operations Manager; Bryan Laubscher, Los Alamos National Laboratory. Michael Evans, ARC Business Manager, was present during the entire meeting.

WELCOME & HOUSEKEEPING

Jeffrey Pier, Chair of the Council, chaired the meeting. All except the beginning and final segments of the meeting were conducted in open session. Evans declared that Council members present constituted a quorum as defined by the PoO and thus were capable of conducting business. He also reminded those present that the Council operates on the majority vote method of decision-making and that the BoG Chair and representatives of the Affiliate MOU Partners are non-voting members. Pier introduced Yasushi Suto, a new member representing JPG to the members and guests. Pier stated that the 2004 SDSS budget resolution is on the agenda for today but depending on how things progress today

there may be a need for another teleconference or in person meeting before the annual ARC Board of Governors meeting.

Kron provided a comprehensive progress report augmented by a Powerpoint presentation: ***Director's Report - Status of the Survey***, with diagrams and graphs. The presentation slides are shown in Appendix RK-1.

Data Collected

Number of spectra (north + south regions of sky, not including duplicate spectra)

Main galaxies	310,300
Luminous red galaxies	42,630
Additional galaxies	10,210
Quasars	48,080

The Five-Year Baseline Plan calls for 1540 plates. At 495 Main galaxies per plate, 60 LRG's per plate, and 67 quasars per plate, this goal is equivalent to

		(done)
Main galaxies	762,000	(41%)
Luminous red galaxies	92,000	(46%)
Quasars	103,000	(47%)

North Galactic Cap:
5841 "unique" square degrees
4830 "footprint" square degrees

cf. 7700 unique sq. deg. in the Five-Year Baseline Plan

South Galactic Cap:
Outrigger stripes are finished (468 square degrees)

Equatorial stripes have 2181 square-degrees-equivalent (the equatorial area has been scanned 8 times on average).

Several diagrams were presented showing the status of survey stripes along with two graphs which showed the planned vs actual progress in imaging and spectroscopy. Imaging is about 4 months behind and spectroscopy about 6 months behind the baseline schedules. Spectroscopy is lagging imaging more than anticipated. It will not be possible to complete the spectroscopy in five years. The original plan was to stop imaging in the last year and do more spectroscopy. View these graphs in Appendix RK-1, pages 5 – 9.

Data Processed

We are finished with image reprocessing for DR2, and finished with image reprocessing for DR3.

We are current with processing MT data.

All plates have been processed with rerun 22; all plates will be processed with rerun 23 soon. Rerun 23 is the DR2 version.

Data Distributed

DR1 made available to Collaboration via the Data Archive Server (DAS) on Nov 11 2002

DR1 made available to the Collaboration via the Catalog Archive Server (CAS) on April 11 2003

DR1 contains:
2099 square degrees of imaging data
291 plates

Fall plates and imaging
The various "southern spectroscopic" programs sum to 209 plates. We have observed 64 so far (2002, and thus far in 2003).

39 plates target stars, and of these we have observed 17.

Imaging continues on stripe 82. As a test that we can successfully obtain and analyze data in crowded fields, and scan along a new system of great circles, we have been undertaking some of the SEGUE stripes:

Aug 22	2.3 hrs
Sept 27	2.9 hrs
Sept 28	1.9 hrs
Sept 29	1.4 hrs

Pipeline Improvements
The image processing used for DR1 contains a documented bug whereby model magnitudes have a systematic offset (but colors derived from model magnitudes are OK). Moreover, the scale sizes of galaxies derived from the model fits are systematically wrong.

Reprocessing of the data is complete with a new version of the software that provides reliable model magnitudes and uses improved flat fields. The reprocessed DR1 data will be re-released as part of DR2.

The spectroscopic pipelines have been improved since DR1:

1) stellar radial velocities are improved by better assignment of templates;
2) the precision of the spectrophotometric calibration is improved by applying a better understanding of the spectra of the standard stars; and
3) the user can now choose to apply the "smear" corrections to account for flux not included within the fiber.

These enhancements are part of rerun 23 (DR2).

Collaboration Affairs
Scientific Spokesperson appointment

The Collaboration Council (CoCo) nominated individuals to stand for election for the position of Scientific Spokesperson. These names were evaluated by the Management Committee, and some were asked if they would be willing to run. Two individuals agreed to do so. The election process, including the definition of the list of eligible voters, was then undertaken by CoCo.

Over 100 votes were cast. Michael Strauss was elected to serve a two-year term beginning 1 October 2003.

Collaboration meetings
October 2, 3 Fermilab (also Working Group Meetings Oct 1 and 4) - 91 registrants

Spring 2004 - Las Cruces, NM

Publications

306 papers posted to the SDSS publication page
53 of these have been posted since June 9 2003
of the 53, 48 are submitted to a refereed journal

Dissertations Posted Since 9 June 2003
Thesis 39: Marcel Agueros (Advisor: Scott Anderson)
Studies of X-ray Selected Stars from RASS/SDSS

Thesis 40: David Johnston (Advisor: Joshua Frieman)
Probing galaxy-mass higher order correlation functions with Weak Lensing

Thesis 41: Adam S. Bolton (Advisor: Scott Burles)
Spectroscopic Gravitational Lens Constraints on Galaxy Mass Distributions

Revised Publications Policy
We now have a third category of publication, Data Release papers. With CoCo input, MC input, Collaboration input, and approval by the Publications Coordinators, we would like to make this change to the Pub Policy (and along the way fix some other things).

The proposed new version is at:
http://www.astro.psu.edu/users/dps/sdsspubpol.html

The SDSS Collaboration Policies can be found at:
http://www.sdss.org/policies/index.html

Retirements and Access to Data:
The SDSS Principles of Operation and other documents spell out the rules for access to the data archives, but there is no language that clearly covers the case where a participant retires and wishes to continue to work with non-public data. Wording in PoO is not clear with respect to status of scientists who retire from an institution but who may not have fulfilled the two-years service criterion.

> 4.1.2 At ARC Participating Institutions
> At ARC Participating Institutions, Participants are defined to be full-time PhD-level scientific staff that receive at least 50% of their annual salary from that institution. They must also either have Principal Investigator status at that institution or have performed the equivalent of two years service to the SDSS (as judged by the Director).
>
> 4.1.3 At non-ARC Participating Institutions
> At non-ARC Participating Institutions, Participants are defined via the individual MOU's.

Discussion: *This situation has been discussed within the Collaboration Council and the Management Committee. The strong sense is that the project should indeed support the continued productive use of the archives by retired participants*. The Council agreed with the proposed changes and directed Kron to implement these changes.

Other Updates
MOU with AAT Board – still in draft form
Data Distribution Plan – April 5, 2001
Five-Year Baseline Plan – February 5, 2001
Management Plan – V1_2 November 10, 2001
Close-Out Plan – updated version available

Discussion: Sinisgalli asked how the project was doing in regards to keeping in contact with our sponsors at the Sloan Foundation and the NSF.

Kron stated he is in contact with Cohen about once per month. His last contact was just last week. Kron also stated that he and several other SDSS collaborators (Wyse, Majewski, Rockosi, Newberg, Beers & Finkbeiner) made a SEQUE science plan presentation to NSF on September 24th.

Sinisgalli stated that Cohen will retire soon.

Andrew Clegg is Jim Breckenridge's replacement at the NSF. The annual reports to Sloan and the NSF are due soon.

Sinisgalli asked how the equipment is holding up at APO.

Kron stated that the equipment is in good condition due to the hard work of the APO staff. Gillespie added that the telescope is now five years old and replacement parts are or will become hard to find. Boroski added that there are never-ending little problems but the APO staff is doing a very good job with the preventative maintenance program and a spares inventory is maintained. For example, the bearing for the wind baffle had a 10-14 week lead time, cost about $3K/each.

Boroski provided a comprehensive data distribution progress report augmented by a Powerpoint presentation: ***Data Distribution – Status and Plans***, with several tables and graphs. The presentation slides are shown in Appendix BB-1.

Data Distribution Usage Statistics

- DR1 – Data Archive Server (DAS)
  - Released to collaboration on November 11, 2003
  - Released to the public on April 4, 2003
- DR1-Catalog Archive Server (CAS)
  - Released to the collaboration on April 11, 2003
  - Released to the public on June 11, 2003
- EDR DAS and SkyServer
  - Released to the collaboration and public on June 5, 2001
- Data currently served through a combination of servers at Fermilab and Johns Hopkins, with mirror sites established in Germany and Japan.
  - Mirror sites are not established or supported with ARC funds.
- Usage measured in terms of
  - number of hits and queries to the skyserver/CAS
  - number of hits to DAS website and volume of data transferred from DAS rsync server

DR1 – DAS Usage Stats

DR1-DAS being served from Fermilab

- During the period April through September 2003
  - ~87,000 hits on the DAS web pages
  - 8.97 TB of data transferred via rsync server

See Appendix BB-1 page 4 for the DR1-DAS: Volume of Data Transferred from rsync Server graph.

SkyServer / CAS Usage Stats

- Early Data Release (EDR) data available through the EDR SkyServer
  - Primary site at JHU, then FNAL, now JHU
  - Mirror sites in Germany and Japan
  - In addition to SDSS data, skyServer contains educational content that is heavily used.

- DR1 data being served through the DR1-CAS
  - Primary site at JHU

- Contains DR1 data for collaboration and public use.
- DR1-DAS does not contain educational content.
- DR1 skyServer being prepared for public release on October 4

EDR Sky Server Usage Rates

Total Hits since Inception	English Sites (FNAL & JHU)	German Site	Japanese Site	Educational Project Web Page Hits	Other
18.28M	11.59M	0.24M	2.09M	1.83M	2.53M

Total usage over past 12 months (all sites) = ~10.12 million hits

See Appendix BB-1 page 6 for the EDR SkyServer Usage Over Past 12 months. The valleys in the graph are likely due to the server being offline for periods of those months.

DR1-CAS Usage Rates

	Collab Server	Public Server	Total
Number of hits since inception in April 2003	40,600	157,815	198,275
Number of queries since inception in April 2003	139,520	125,250	264,770

See Appendix BB-1 page 7 for the DR1-CAS Usage – Total Number of Hits graph and the DR1-CAS Usage – Comparison of Collabor and Public Server Use. The apparent drop in hits on the collaboration server is the result of collaboration members using the public server after it's release.

Data Release Usage Summary

- Have transferred 8.97 TB of data via the DAS rsync server.
- Have received ~18.4M hits on the EDR SkyServer, ~87,000 hits on the DR1-DAS web pages, and ~198K hits on the DR1-CAS.
- Usage continues to grow from both the astronomy and education communities.
  - Increased usage equates to increased community support for the SDSS project.
  - May play a role in strategy and success of future fundraising.
- Respond to three helpdesk requests per week (on average).

Data Release Coverage

- Data Release Contents
  - DR1: all survey quality imaging data obtained prior to July 2001
  - DR2: all survey quality imaging data obtained prior to July 2002
  - DR3: all survey quality imaging data obtained prior to July 2003

  Plus the corresponding spectroscopic areas.

Cumulative Sky Coverage

	Imaging Area	Spectroscopic Area	# of Plates	# of Spectra
DR1	2099 sq. deg.	1360 sq. deg.	291	~186K
DR2	~3300 sq. deg.	~2560 sq. deg.	570	~365K
DR3 (approx)	~4700 sq. deg.	~3700 sq. deg.	820?	~525K

DR2 is a full re-processing of all data obtained through July 2002 (replaces the DR1 dataset)

DR3 will be an incremental release containing data obtained between July 2002 and July 2003.

DR2 Status

- **Data Processing**
  - All imaging data collected to data has been processed with Photo v5_4_n, calibrated, checked for quality, and stuffed into the obDb for access by the collaboration (more sophisticated users). This not only includes DR2 data, but DR3 data as well.

  - Spectro data has been partially processed.

    - All spectro data has been run through idlspec2D
      - ~15 of 574 plates require some additional work (e.g., header fixes)
    - Spectro 1D currently undergoing final round of tests
    - Final processing through spectro 1D should commence early next week and take approx one week to complete.
    - Testing for data quality and integrity will add another week (much will occur in parallel with processing)
    - Barring unexpected problems, we anticipate that all re-processed data will be inspected and ready to prep for CAS loading by mid-to late-October.

- **Data Distribution – DAS**

- All imaging data has been placed on the DAS server and the collaboration informed of its existence through sdss-general
    - Collaboration members have full access to this data, but do not have the same web interface tools which make finding data easier.

    - Interface tools for DR1 were built on MySQL database. Does not exist for DR2, so interfaces will be redone in Microsoft SQL Server as part of CAS deployment.

- Spectro data will be made available as soon as it is processed and passes QA.
- DAS web pages need to be updated for DR2.

- **Data Distribution – CAS**

- Plan has been to deploy DR2-CAS from Fermilab
- Implementation of CAS software and training of Fermilab personnel occurred during past summer. Still underway.
- "Test Load +" recently loaded successfully at Fermilab (contains ~20% of DR2 data). Availability of dataset will be announced to the collaboration.
- Loading of imaging data is currently underway (joint effort between JHU and FNAL)
    - Approximately 65% of imaging data loaded
    - Loading should be finished within another week, barring unexpected problems
- Spectro and tiling data will be loaded as the data become available.
    - CAS loading will take ~1 week to complete, once data is inspected and validated.
- Good possibility that first full load of DR2-CAS may be finished by mid-November.

DR2 – Remaining Work

- Finish spectro data processing and visual inspection
- Load spectro data onto DAS server
- Resolve remaining minor issues with processed data
- Finish loading imaging, spectro, and tiling data into CAS
- Develop DAS Imaging Query Server (IQS) and Spectro Query Server (SQS) interfaces in SQL Server

- Set up internal mirror sites and load handling to maintain data availability and achieve good query response performance.
- Extensively test loaded databases (for mechanical and scientific integrity)
- Update web pages and documentation to describe DR2 data set
- Shooting for a completion data in early November
  - Not inconsistent with schedule outlined at June AC meeting.
- Public release is scheduled for Jan 04.
  - Releasing DR2 if full to collaboration by mid-November still provides approximately three months of access before public release.

DR3 Outlook

- Intend to use same DAS and CAS for DR3
  - No development, only bug fixes and web page changes.
- DR3 imaging data has already been processed.
  - Already available to the collaboration via the DAS server.
  - If data is from new area of the sky (i.e., not previously observed), then it could be loaded into the CAS"Best" database.
  - Imaging data cannot be loaded into the CAS "Target" database unti it is used for spectroscopic target selection. Delays getting this data into the hands of the collaboration via the CAS.
- DR3 spectro data will be processed shortly (perhaps one month after DR2 processing is complete)
  - Can be loaded into collaboration version of CAS with corresponding "chunks" of imaging data.
- DR3 loading will require additional computer hardware
  - One 4 TB server: estimated cost=$10K; lead-time = 4 wks
- We will proceed with loading DR3 data as soon as DR2 data is loaded and validated.
  - Will proceed with loading DR3 data into a collaboration CAS, but not at risk of jeopardizing DR2 release. Dr2 remains highest data distribution priority.
- DR3 is officially scheduled for Oct 2004 public release. We are confident that we can make this date and that we can release a version of the DR3 CAS to the collaboration in early Spring 2004.

Discussion: Kron asked for advice from the collaboration's regarding the lead time for the collaborations access to the DR3 data before the release to the public.

Heckman asked about the status of the plan for the long-term archive of the data.

Boroski stated that the data archive needs attention and further study. We need to find out how much it will cost to staff a help desk. It could be rather expensive.

Boroski provided a comprehensive financial status report augmented by a Powerpoint presentation: ***Budget Status and CY2004 Request***, with several tables included below. The revised presentation slides are shown in Appendix BB-2.

Comparison 2003 Cost Forecast with 2003 Budget
Cash and In-kind Combined, in $K

	2003* Approved	2003 Forecast
Survey Management	461	514
Collaboration Affairs	16	10
Observing Systems	1,332	1,210
Data Processing & Distribution	1,555	1,633
Observatory Support	1,447	1,450
ARC Corporate Support	189	108
Management Reserve	201	0

TOTAL	5,200	4,925

*2003 Budget approved by ARC on Nov 25, 2002

Comparison 2003 Cost Forecast with 2003 Budget
Cash Budget Forecast, in $K

	2003* Approved	2003 Forecast
Survey Management	245	334
Collaboration Affairs	16	10
Observing Systems	769	664
Data Processing & Distribution	533	574
Observatory Support	,447	1,450
ARC Corporate Support	189	108
Management Reserve	201	0
TOTAL	3,400	3,140

*2003 Budget approved by ARC on Nov 25, 2002

Comments on the 2003 Cost Forecast

Cash Budget Highlights

Survey Management augmented to include:

- Support for new Survey Director
- Additional summer salary for Project Scientist
- Time domain white paper preparation.

Observing Systems appears under spent because:

- Funds held in ARC Corporate for unanticipated hardware problems, not needed this year;
- Funds held for additional technical support, not needed this year;

Data Processing and Distribution appears overspent:

- Purchased additional hardware for data processing and distribution, and will need to purchase one more box (~$10K);
- Some salaries increased more than anticipated in baseline budget.

Observatory Support budget right on track for the year.

ARC Corporate account appears under spent;

- Holds funds for additional scientific support and personnel replacement costs, which were not needed this year;
- Holds funds for Director's ad-hoc reviews, none of which were held this year.

Cost to Complete the Five-year Survey

Total Cash and In-kind, in $K

	Cost to Complete*	5-year Cost
Survey Management	830	2,578
Collaboration Affairs	37	78
Observing Systems	1,735	7,721
Data Processing & Distribution	2,373	8,653
Observatory Support	2,423	7,482
ARC Corporate Support	291	761
Management Reserve	450	450
TOTAL	8,140	27,724

*For the period Jan 1, 2004 to Nov 30, 2005 (incl. Closeout costs).

Resources available to complete the Five-year Survey

Committed resources for 2004-2005

- A P Sloan Foundation (cash) $1,000K
- NSF (AST-0096900) (cash) $1,542K
- New Partners Funds (cash) $3,050K
- Fermilab (in-kind) $2,391K
- JPG (cash & in-kind) $84K
- USNO (in-kind) $202K
- LANL (in-kind) $222K
- Interest earnings & insurance claim $473K*

Total Resources Available	$8,964K

*not updated from last November

Evans stated that interest rates are currently so low that all callable bonds are being called at the first opportunity which forces bondholders, like ARC, to reinvest in instruments with lower interest rates. The investment earning projection made last spring needs to be re-evaluated. If the BoG's decides to pay down the unpaid invoice debt before the end of the survey it will also affect the projected investment earnings.

Financial Outlook

- There are sufficient funds to complete the 5-year survey and a minimal closeout Plan.
- Closeout plan has been revised and expanded
  - Total closeout cost ~$485K
    - Cash budget ~$322K; in-kind contribution ~$168K
- Potential surplus of $824K, provided 2003 forecast is accurate, we continue to hold costs under control, and we do not encounter any large unexpected expenditures.

CY2004 Budget Request

Cash and In-kind, in $K

	2003 Request	Forecast
Survey Management	485	514
Collaboration Affairs	16	10
Observing Systems	1,189	1,210
Data Processing & Distribution	1,647	1,633
Observatory Support	1,522	1,450
ARC Corporate Support	176	108
Management Reserve	172	0
TOTAL	5,206	4,925

Cash portion = $3,400K; In-kind = $1,806K.

The following 2004 SDSS budget resolution was presented as a transparency for the Councils review.

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SDSS OPERATIONS BUDGET RESOLUTION
ADOPTED by the SDSS ADVISORY COUNCIL
at its OCTOBER 1, 2003 MEETING

WHEREAS, the SDSS Director has proposed an operations budget of $5,206K for calendar year 2004 and recommended that the SDSS Advisory Council (Council) approve that budget;

WHEREAS, the Council considers the proposed operations budget for calendar year 2004 in the amount of $5,206K to be necessary to sustain optimal operations;

WHEREAS, the Council has determined that $5,206K of funding for SDSS operations during calendar year 2004 is assured by funds in hand or pledged by SDSS participants and sponsors;

NOW THEREFORE, be it resolved that the Council approves, and recommends that the ARC Board of Governors approve, an operations budget for SDSS for the period January 1 through December 31, 2004 in the amount of $5,206K with the understanding that the allocation of this budget among project activities will be determined by the SDSS Director in consultation with the ARC Treasurer, and with the further

understanding that the Council will be informed monthly of progress including the actual allocation and expenditure of funds provided by this budget. The funding for this budget is anticipated from multiple sources as follows: Sloan Foundation, $1,000K cash; NSF, $844K cash; JPG, $84K cash; Interest Earnings, $728K cash; New Members Fund, $744K cash; DOE (Fermilab), $1,425K in-kind; USNO, $133K in-kind; and LANL, $222K in-kind.

Action: Sinisgalli made a motion, seconded by Poehler, that the budget resolution be approved. The motion passed unanimously with no one abstaining.

Executive Session

The Executive Session is not included in sdss-general version of the minutes.

OPEN SESSION

Kron provided a comprehensive science overview, observing and management plan for and extended survey report augmented by a Powerpoint presentation: ***A New Survey I: Science Overview, Observing Plan, and Management***, with images, diagrams and graphs. The presentation slides are shown in Appendix RK-2.

Draft Proposal – Combining the White Papers

Executive Summary
1. Introduction
2. SDSS science
3. Overview of the proposed new work
4. Closing the gap and LSS
5. The SDSS Legacy
6. Galactic 1: halo streams, formation of the galaxy
7. Galactic 2: dust and star formation
8. Supernova light curves
9. Integrated observing plan
10. Relation to other projects in astronomy
11. Participants
12. Management
13. Budget

Most of these chapters are available at
http://www/astro.princeton.edu:81/documents/gk/PROPOSAL/

The Legacy Core Program
Enhance large-scale structure studies by creating a single large volume in the North Galactic Cap. By joining together the two halves of the SDSS survey, the completed survey area dramatically increases the smallest dimension of the survey. This improves the resolution of the power spectrum and thus the detectability of the "baryon wiggles."

Closing the gap will greatly lower the surface-area-to-volume ratio. Moreover, some of the richest structures in the nearby Universe lie in the gap.

See the Tegmark et al SDSS No. 234, 205,000 redshift graph and the Oguri, Inada et al SDSS No. 265 275 Subaru I-band image of quad lens in Appendix RK-2 pages 4 and 5.

The Galactic Core Program
Unravel the structure, formation history, kinematical and dynamical evolution, chemical evolution, and dark matter distribution of the Milky Way to provide a cornerstone for understanding galaxy formation processes in general.

The data will enable discovery of all major Galactic substructures, including tidal tails from merger events in the Galactic halo as well as in the disk.

Low-galactic-latitude imaging and spectroscopy enable studies of the metal-rich Galactic thin disk, the vertical structure of the thin and thick disks, the Galactic warp and flaring, the three-dimensional structure of the interstellar medium, and present star-forming regions.

The Supernova Core Program
Understand the physics responsible for the accelerating expansion of the Universe.

Supernovae remain the outstanding way to probe the evolution of the cosmological scale factor for $z < 1$.

The new survey will make a substantial contribution to the Hubble diagram using Type Ia supernovae, strengthening the constraints on SN Ia systematics, and providing critical templates for a future satellite mission to observe large numbers of Sne at $z > 1$.

The operational goal is to fully characterize the light curves of 200 Type Ia supernovae in the redshift range $0.05 < z < 0.35$ with well-sampled, five-band photometry.

See additional S/N images and charts in Appendix RK-2 pages 9 – 13.

Baseline Observations to Undertake the Core Programs

Legacy Core Program
Complete the mapping of the area between stripes 10 and 37, inclusive, with both imaging and spectroscopic data, using the standard targeting algorithms in the main SDSS survey.

The quality standards for acceptance of data for both imaging and spectroscopy will be the same as applied to the SDSS.

Starting from now, we need 3200 unique sq. deg. and 928 plates for this program

Galactic Core Program
Photometric observations of stripes 72, 79, and 90 in the SGC, ~700 sq. deg.; best time is Sept/Oct

12 new stripes approximately 60 degrees long, following lines of constant Galactic longitude and centered on the Galactic equator: ~1800 sq. deg.; worst time is March/April/May

The total is about 2600 square degrees.

Spectroscopic tiles are spaced every 10 deg in Galactic latitude: 135 tiles. An additional 65 tiles are placed on specific places, e.g. streams, dwarf galaxies, star-forming regions.

Each tile is observed with two plates, one with the standard exposure, and with twice that length and with a separate set of targets. Total plates = 400. Total standard-length-equivalent plates=520.

Discussion: The current Galactic Core document should split imaging and spectroscopy. The current text dwells on imaging which may be complete. Kron mentioned the SEGUE science plan presentation by Newberg (RPI), Wyse (JHU), Majewski (UVa), Rockosi (UW), Beers (MSU) and Finkbeiner (PU) to the NSF on September 24th and showed several of the slides used in that presentation. The NSF presentation slides are shown in Appendix RK-0.

Supernova Core Program
Scan a stripe such as stripe 82 in the South as often as conditions permit. The scans will be at the normal (sidereal) rate, so that an 8-hour night yields a strip 120 degrees long.

Imaging is to be conducted during time that would otherwise be used for spectroscopy: non-photometric, poor seeing, and moonlight.

The campaigns to measure supernova light curves are conducted during two intervals each at least three months long, and during other two-month intervals if that time is available.

Imaging Plan (units are square degrees)

	SPRING 2/3				FALL 1/3			
	Gap	Low Lat	Extra	(SP)	Repeat	High Lat	Low Lat	SN
2003					380	270		150
2004	1600				380	270	150	
2005	1450	150				270	530	
2006	150	820	630	(630)				x
2007			1600	(800)				x
2008			1600	(0)				

Gap = central region of NGC
Extra = square degrees not required for imaging
(SP) = time allocated to spectroscopy
Repeat = multiple passes on the equator in SGC
SN = supernova light-curve campaign

The Fall 2004 and 2005 low-latitude observations are for the proposed survey extension. Fall 2006 and 2007 time are open for S/N observations.

Spectroscopic Plan (units are standard-length plates)

	SPRING 2/3			FALL 1/3		
	Gap	Galactic	Extra	SDSS	Galactic	SN
2003				90	30	
2004	240			90	30	
2005	240				120	
2006	240		44			x
2007	160	80	56			x
2008	80	160				

Gap = central region of NGC
Galactic = stellar targeting
Extra = more Galactic plates exposed in lieu of imaging
SDSS = spectroscopy in SGC prior to mid-2005

Governance
The SDSS Principles of Operation (PoO) has successfully provided a set of procedures for the governance of SDSS within ARC, and these will

continue through mid-2005, to the end of the SDSS Baseline Survey. The PoO can provide the foundations for governance for the new survey with appropriate modifications.

In other words, despite the expanded scientific agenda of a new survey with its three Core Programs, it is both possible and most efficient to manage the survey in the same way as for the SDSS, that is one management structure, and one operations system for data acquisition, data processing, and data distribution.

One significant change is to replace the current Working Groups with "Project Teams" which undertake efforts that assist survey operations.

These efforts include the design of target-selection algorithms, the specification of required calibrations, monitoring pipeline outputs for quality assurance of the data, optimizing the sequence of observations for the end-game, and the writing of technical papers.

The Project Teams also serve as centers of expertise to advise on matters of necessary systems or software development, and the content of data releases. Each Project Team has an executive group and a Chair. The Management Committee will prepare a charge for each Project Team.

Figure 12.1 Organization Chart for ARC/ODSS Management and Figure 12.2 Organization Chart for Survey Operations were presented and discussed. See Appendix RK-2 pages 21 and 22 for the actual organization charts.

Discussion: The Council suggested the Organization charts be revised some. The ODSS Directorate portion of the ODSS Directorate / Management Committee box should be deleted, as it is a duplication of the same people. The 7 committees lists under Project Team Executive Committees should match the 3 core projects. One person should be named the responsible person for the three core projects. Possibly the Galactic committee should be split into high and low-latitudes. The low latitude observations (10%) could be costly and more difficult than the high latitude observations (90%).

The $14.1M cost estimate for the extension does have software development costs. Currents funds should not be used to write code for the extension but some currents funds are needed for some small amount of survey extension proof-of-concepts software code.

Boroski provided a survey plan and cost estimate for an extended survey augmented by a Powerpoint presentation: ***A New Survey: New Development and Cost Estimate***. The presentation slides are shown in Appendix BB-3.

New Development Tasks
Mountaintop Operations
Observing procedures are currently being tested. There are a few minor bugs to work out in the observing programs, but nothing serious.

There is a concern about the stability and long-term reliability of the DA system. It is already approaching 10-years old. Estimates range from $33K to $300K, depending on what may be required.

Son-of-Spectro, which is used to determine when a plate can be declared "done", will likely need to be tweaked to better handle sky subtraction.

Some fields may require a sky fiber for each science fiber. We do not currently subtract each object's sky from the object because of the way

bookkeeping is currently done. This should not be difficult to modify, but it does mean real work for someone.

Data Processing

Preliminary tests indicate that the photometric pipeline may have trouble in high-density fields. Some preliminary work is required before we fully understand the scope of new development work.

An initial step will be for Zeljko Ivezic to address some existing PRs related to problems the Postage Stamp Pipeline (PSP) has processing crowded fields. Doing so may shed light on whether there's a simple fix to the current algorithms or whether significant recoding is required.

We will also need Robert Lupton to look at various n^2 algorithms in the Frames pipeline that currently take an extremely long time to run in crowded fields. The goal will be to determine how feasible it is to replace these algorithms with faster, more efficient ones.

Data Distribution

We would like to use the existing databases to load and distribute the data to the collaboration and general astronomy community.

Data models will need to be updated and work will have to be done to accommodate the vastly larger number of sources in the low-latitude fields.

Some definition of density is required and then we begin exploring the extent to which the existing databases and access tools will need to be modified.

Cost Estimate for 3-year Survey ($K)

Category/Yr	2005	2006	2007	2008	Total
Survey Management	269	491	495	239	1,494
Observing Systems	847	982	1,003	461	3,292
Data Processing	292	616	632	330	1,870
Data Distribution	229	446	464	260	1,400
Observatory Operations	745	1,534	1,595	828	4,703
ARC Support for Sur Ops	60	125	130	54	369
Survey Ops Subtotal	2,174	3,703	3,824	1,933	11,633
ARC Corporate Support	44	50	52	52	172
Management Reserve	160	250	250	140	800
Total	2,646	4,493	4,621	2,339	14,100

Survey Management

- Budget provides for salary, travel, and modest office supply costs for ARC Administration, as well as the Director, Project Scientist, Project Manager, and their support staffs.
- Budget provides for travel and office expenses for the Spokesperson, and support for collaboration and public affairs that are coordinated by the Spokesperson.
    - Page charges for technical papers;

- AAS meeting expenses;
- Data release brochures
- Salary, travel and office expenses for a part-time Public Information Officer.

Observing Systems

- On-the-mountain engineering support to maintain and repair as necessary the various systems that support observing operations.
- Two engineers, two technicians, 2.25 plug-plate techs, 0.5 FTEs of clerical help. (6.75 FTEs total)
- Budget to procure spare parts, materials and supplies at a level comparable to what we see today (~$55K per year)
- 1.5 FTEs of off-mountain engineering support, with modest travel and supplies support.
- 0.75 FTEs of off-mountain engineering support, with modest travel and supplies support.
- $290K for plug-plate productions spread over a 2.5 year period.
- Various support costs (mirror aluminizing, additional technical help)
- Observers' Fund has been retained at $12K per year.
- DA system upgrade
  - Funds held in the first year, which is why first year budget appears so high.
  - Detailed analysis is required to determine actual work required.

Observatory Support

- Eight observers
- Technical staff support
- Partial salary support for other members of the observatory staff responsible for maintaining safe work environment and providing infrastructure support.
- Total level of effort = 14.4 FTEs.
- There may be room to scale back on the level of effort supported by the extension budget.

Data Processing

- Assumption made that core data processing operations will occur at Fermilab following the existing model
- Salary support for 1.0 FTE of scientist support, 0.25 FTEs of post-doc support, 2.5 FTEs of computer professional support to actually process, inspect and load the data.
- Travel and office expenses
- Approximately $50K per year for DLT tapes, $22K per year for software licenses, and $110K per year for computer hardware upgrades.
- Salary support for 1.0 FTE to support the photometric pipelines and 0.5 FTEs to support the spectroscopic pipelines. These individuals will also support the development and implementation of appropriate QA tools.

Data Distribution

- Assumption that core data distribution activities will occur at Fermilab following the existing operations model.
- Budget provides salary support for 0.75 FTE of scientist support, 0.25 FTE of post-doc support, and 1.0 FTE of computer professional support. Integrated over the project, average level of effort is 2.0 FTEs per year.
- Approximately $30K per year for data distribution hardware
- Salary and travel support for an additional 1.25 FTEs of database development and deployment support.

ARC Corporate Support

- Budget provides for business expenses such as insurance, audit fees, bank fees, storage unit costs, petty cash accounts.
- Covers two Advisory Council meetings per year, as well as one independent review during the course of the project to assess performance and identify potential areas for improvement.

Management Reserve

- Management Reserve is set at $800K for the 3-year period.
- Equates to 5.7% of total project cost, which is not much. However, annual levels are comparable to what we've been running with for the baseline survey. Should be ok.

Kron provided an overview of the benefits to and resources needed from the institutions for an extended survey augmented by a Powerpoint presentation: ***A New Survey III: Benefits to and Resources Needed from the Institutions***. The presentation slides are shown in Appendix RK-3.

Benefits to the Institutions

- Data
- Early access to a new kind of data: the low-latitude survey of the sky
- Early access to additional observations of extragalactic objects (e.g. Coma and Virgo)
- Early access to another new kind of data: the time-domain campaign
- The repeat scans for the time-domain enable not only supernovae, but numerous other kinds of transient objects to be identified in near-real-time
- First chance for serendipitous discovery
- Significantly more (~1.33) scientifically useful data exist than we are obligated to distribute to the public. These data are available to the Collaboration (currently ~2900 extra sq. deg. and ~235 extra plates)

Collaboration and Research

- The collaboration is a highly productive scientific organization – publications, value-added catalogs, code
- The network of scientific collaborations supported by survey policies – young astronomers can take advantage of mentors who are distributed through out the project
- SDSS organizes AAS Special Sessions and other conferences that can advance the careers of young astronomers
- SDSS has an excellent record of seeing young astronomers placed into good positions, often at another participating institution
- SDSS provides support for using the databases and interpreting results
- Less time spent in graduate school: students can conceive of thesis ideas, test them, and execute them quickly
- Section 5.3 of the PoO describes the mechanism whereby Initiatives, namely projects other than the Core Programs, can be realized with the use of the facilities

Departments

- Astronomy departments that have already invested in the extragalactic science of the SDSS will be poised to involve a still larger proportion of their faculties

- Departments will have a voice in guiding a major new scientific venture

Funding the New Survey

- The cost estimate for three years of operations is $14.1M, or on average $4.7M/yr
- The current annual budget (CY2004) includes $3.4M cash and $1.8M in-kind for a total of $5.4M
- We can consider a model where we define "core" operations tasks (data acquisition and processing), and then identify as many FTE's as possible who could undertake these tasks on an in-kind basis
- Cash resources will be required to support the remaining FTE's, as well as expendables, etc

Non-core activities include:

- additional software development
- scientific QA checks, and
- Collaboration Affairs

These activities would be contributed by the partners

Categories of FTEs

Mountaintop Operations 20.75

Observers – 8 FTEs
Engineering support – 3 FTEs
Instrument scientist – 1.0 FTE
Plug plate techs – 2.25 FTE
Clerical support – 0.5 FTE
Infrastructure support – 3.o FTEs
Plate production; other engineering support – 2.0 FTEs
Off-mountain software and DAQ support – 1.0 FTE

Data processing and distribution 9.0

Software and data processing support – 4.25 FTE
Computer professionals performing data processing – 2.0 FTEs
Data distribution, database support, and SDSS website – 2.25 FTE
Computer professional supporting production data processing and distribution – 0.5 FTE

Management 5.5

Project Manager – 1.0 FTE
Senior faculty in management positions – 3.5 FTE
Administrative support staff – 1.0 FTE

Discussion: Sinisgalli presented a strawman funding model for the survey extension. If the cost estimate for three years is $14M and $5M of the $14M is in-kind then the cash requirements would be $9M, or $3M per year. The $3M per year could be: $1M from the Sloan Foundation, $1M from NSF and $1M ($250K/ea) from the 4 universities or $200K/ea from 5 members.

Stanfield reminded the Council that the in-kind contribution from Fermilab may not be as generous in the survey extension and that it would be very difficult to use NSF funds on Fermilab cash expenses.

There are currently many SDSS participants at non-member institutions. Some funding (numerous small amounts) may also be available from these participants. This avenue of additional revenue needs to be explored.

Executive Session

Executive session is not included in the sdss-general version of minutes.

OPEN SESSION

Discussion:

Sinisgalli: The extended survey cost estimate needs to be reviewed by Boroski with a focus on where in-kind contributions can be matched with resources available in the collaboration. Not having commitments from the institutions should not stop us from moving forward with planning. I will continue to help on the letter to the presidents and where I can in the future, I won't just walk away from ARC/SDSS after 20 years of support.

Pier: We should have an external review of the closeout and 3 year extension cost estimates.

Stanfield: The Fermilab Office of Project Management can help with a cost estimate review, but having a broader review with external reviewers would also be good.

Tremaine: We should ask the Sloan Foundation and the NSF what kind of review they require or recommend.

It was agreed that we should seek funding from both the Sloan Foundation and the NSF simultaneously.

Pier asked for advice on handling the transition to a new Council Chair. The Council agreed that we should have a vote by the ARC Board within a few weeks and have a transition period of mid-October through the end of the year. We need to get Ostriker on board soon. The earlier he can get involved the better, particularly in regards to the letter to the Presidents and in fundraising for the extension. Ostriker, along with Kron, should get involved with Sloan and NSF proposal preparations as soon as possible. Jill Knapp will continue with her excellent support in proposal preparation.

Dodelson asked about the 2-year vs 3-year extension durations. Kron responded that many in the collaboration thought that 3 years was necessary for the spectroscopy, but he would review this further.

Pan-STARRS 4 telescopes are scheduled to come online in 2008 so there seems to be little reason to extend the SDSS survey beyond 3 years. However Pan-STARRS has no spectroscopy. Also it is unclear that Pan-

STARRS will be finished with commissioning before 2010, given our experience with SDSS.

Next Meeting

Since there is still much work to be done on the proposed survey extension and the next ARC Board meeting is already scheduled for Monday November 24th at the O'Hare Hilton, the Council decided to meet again on Sunday November 23rd at 4:00 PM at the O'Hare Hilton.

Action: At 4:00 the motion was made and seconded that the meeting be adjourned. The motion passed by unanimous vote with nobody abstaining.