Sloan Digital Sky Survey II

2007 FOURTH QUARTER REPORT

October 1, 2007 – December 31, 2007

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Q4 PERFORMANCE HIGHLIGHTS

- We obtained 60 square degrees of new SEGUE imaging data. We completed a total of 37 SEGUE plates (18 bright and 19 faint, corresponding to 56 plate-equivalents).
- The Supernova Survey completed its third and final observing season in Q4 2007, carrying out repeat imaging on stripe 82. During October and November, approximately 162 supernovae were spectroscopically confirmed, including 123 type Ia supernovae, on follow-up telescopes.
- We recorded 35.9 million hits on our SkyServer interfaces and processed 6.8 million SQL queries. We also transferred 28.4 terabytes of data through the Data Archive Server interfaces making this our second highest quarter in the history of the survey.
- We began operating mirror sites of the DR5-CAS and SkyServer at the University of Chicago and John Hopkins University.
- Q4 cash operating expenses were $1,122K against a baseline budget of $1,011K. A number of factors contributed to the large overrun, including increased effort on software development; some higher than anticipated salary and utility costs; and the costing of expenses in Q4 that had been budgeted for earlier in the year. Although Q4 expenses exceeded the Q4 forecast, actual costs for the year as a whole were well within the annual budget. Specifically, total 2007 cash operating expenses were $4,248K or $198K (4%) below the budget of $4,446K before management reserve.
- The fall SDSS Collaboration Meeting was held November 1-4, 2007 at Fermi National Accelerator Laboratory in Batavia, IL USA. Some 40 institutions from six countries were

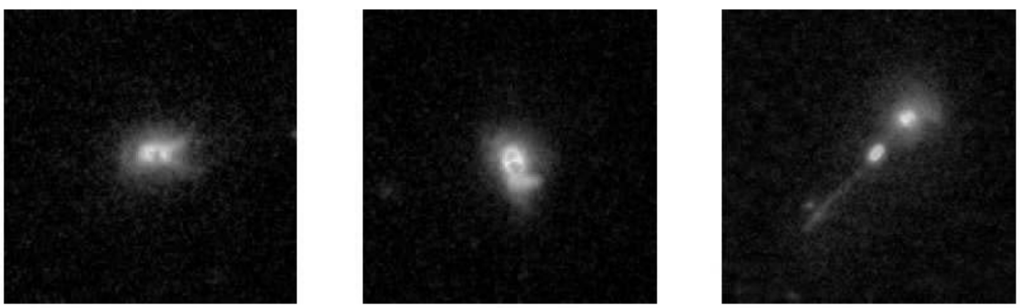
represented by the more than 103 collaboration members and students who participated in the event. The meeting provided a forum for participants to present and discuss survey progress, recent science results, and post-2008 plans.

- Version 2.0 of the Stripe 82 Light-Motion-Curve Catalogue (LMCC) was made available to the SDSS collaboration at http://www.ast.cam.ac.uk/~segue. The LMCC covers stripe 82 from RA = 20.7h to 3.3h and from Dec. = -1.26 deg to 1.26 deg, encompassing ~249 square degrees. The catalogue contains on the order of 4 million light-motion curves (positions and five-band fluxes for each observation) built from the standard SDSS photometry and astrometry of repeat scans of stripe 82.

1. SOME RECENT SCIENCE RESULTS

The following descriptions highlight some of the scientific work accomplished during the reporting interval (bearing in mind that efforts often spill over into other quarters). Unlike the list of publications given in Exhibits 3 and 4, the topic selected here is by no means comprehensive, nor even representative, of the science being undertaken by the SDSS collaboration. The short science description nevertheless augments our reporting of activities in SDSS-II.

Hidden Quasars



Powered by glowing, super-heated gas as it swirls into black holes a billion times more massive than the sun, quasars are the most brilliantly luminous objects in the universe. However, the very gas that feeds the black hole often carries dust that obscures the quasar from our view. Surveys at X-ray and infrared wavelengths, where radiation is less easily blocked, have shown that a substantial fraction of the less energetic quasars are hidden at visible wavelengths. However, these surveys were too small to probe the population of the most luminous quasars, powered by the rarest, most massive black holes.

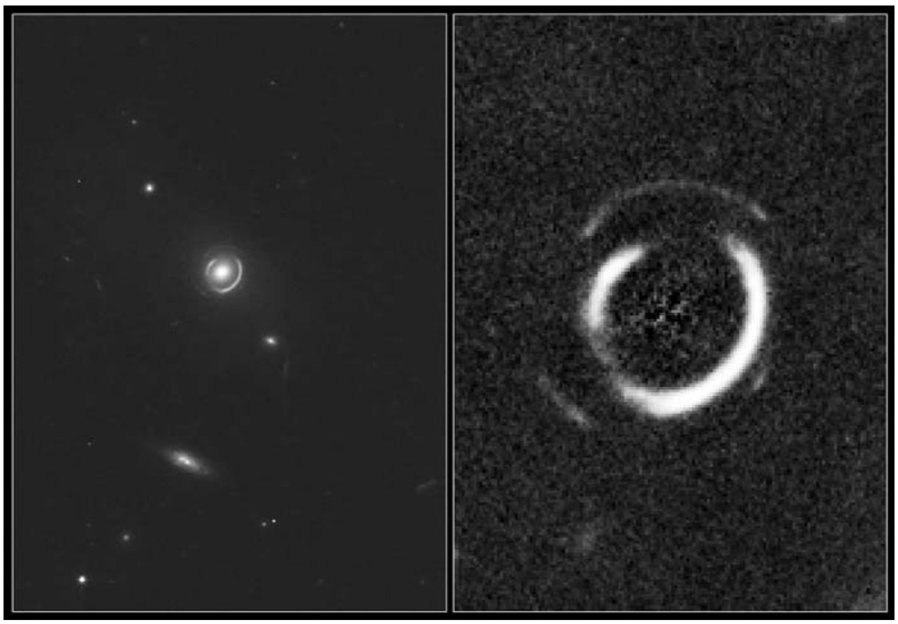
An SDSS team has combed the SDSS data to find nearly 900 of these hidden quasars, which show emission lines from highly ionized gas in their visible light spectrum even when the direct light from the feeding black hole is blocked. They found that obscured quasars are at least as common as unobscured quasars, even at the very highest luminosities. Accounting for these hidden systems implies that accreting black holes are, on average, more efficient at converting mass into energy than previously recognized, since the locally measured black hole population must have produced a larger amount of total luminosity.

These Hubble Space Telescope images show galaxies that host three of the SDSS hidden quasars; if the quasar itself were not obscured, it would overwhelm the galaxy light. The blue patches in the left and central images are light that has been scattered into our line of sight by gas and dust in the host galaxy; they indirectly reveal the influence of the "monster in the middle." The unusual shape of the right-most galaxy shows that it is undergoing interactions with a smaller galaxy that is being ripped apart. The tidal gravitational forces from this interaction may be feeding gas to the center of the main galaxy and causing its black hole to light up.

References:

1. R. Reyes, N. Zakamska, M. Strauss, J. Green, J. Krolik, Y. Shen, G. Richards, S. Anderson, and D. Schneider, Space Density of Optically-Selected Type 2 Quasars, submitted to the Astronomical Journal, preprint arXiv: 0801.1115.

A Double Einstein Ring



This remarkable Hubble Space Telescope image shows the first known case of a double Einstein ring. On the left, a bright elliptical galaxy at the center of the field is encircled by a bright ring (broken into two arcs) and a fainter, outer concentric ring. These are background galaxies whose light has been distorted into nearly complete rings by the gravity of the nearer elliptical galaxy at the center. In the right panel, which blows up the central region of the image, a model of the central galaxy has been subtracted to better reveal the rings.

At the ground-based resolution of SDSS images, the light of the central, lensing galaxy is blurred together with the light of the more distant lensed galaxies. The Sloan Lens Advanced Camera for Surveys (SLACS) team has searched the SDSS galaxy spectra for systems that appear to show the light of an old, massive galaxy mixed with the light of younger galaxies at higher redshift. The team then observed these systems with the superb image resolution of HST, and a substantial fraction turns out to be ring-like gravitational lenses. The sizes of the rings can be used to measure dark matter in the lensing galaxy, demonstrating that elliptical galaxies reside in massive dark halos.

A double Einstein ring requires near perfect alignment of two unrelated background sources with the foreground lens, so it is no surprise that they are extremely rare. They are also useful. The size of the outer ring (the more distant galaxy) measures the mass of the middle (inner ring) galaxy, about 1 billion solar masses. Double-ring systems could also be used to measure the geometry of space-time, using the angular sizes of two objects seen at different redshifts but lensed by the same foreground mass distribution.

References:

1. R. Gavazzi, T. Treu, L. Koopmans, A. Bolton, L. Moustakas, S. Burles, and P. Marshall, The Sloan Lens ACS Survey. VI: Discovery and analysis of a double Einstein ring, preprint arXiv: 0801.1555.

2. SURVEY PROGESS

The period of accounting for this report includes observing runs spanning the period from October 6, 2007 through December 23, 2007.

2.1. Legacy Survey

Table 2.1 compares the imaging and spectroscopic data obtained against the Legacy baseline plan. No new Legacy imaging data were obtained in 2007-Q4.

Table 2.1 Legacy Survey Progress in 2007-Q4

	2007-Q4		Cumulative through Q4	
	Baseline	Actual	Baseline	Actual
Legacy Imaging (sq. deg)	0	0	7808	7577
Legacy Spectroscopy (tiles)	15	7	1541	1513

The weather became less cooperative as we moved into the winter season and we fell short of the Q4 baseline goal for obtaining new spectroscopic data. We completed 7 plates against a baseline goal of 15. This is the last season for Legacy spectroscopy and the issue is now the distribution and number of the remaining plates on the sky, as opposed to progress against the baseline, which was formulated three years ago. The point is that no Legacy plates remain at small RA. In subsequent quarters we will track carefully progress with respect to the remaining plates in the accessible region of sky. Through the end of Q4, we have completed 1,513 plates compared to the goal of 1,541 plates.

The following graphs show progress against the baseline plan. Figure 2.1 shows historical progress against the baseline plan for the Legacy Survey. Figure 2.2 shows progress on the spectroscopic survey. In order to provide a better view of progress against plan, the axis scales on Figure 2.2 have been adjusted to show progress made since July 2005, the start of SDSS-II operations.

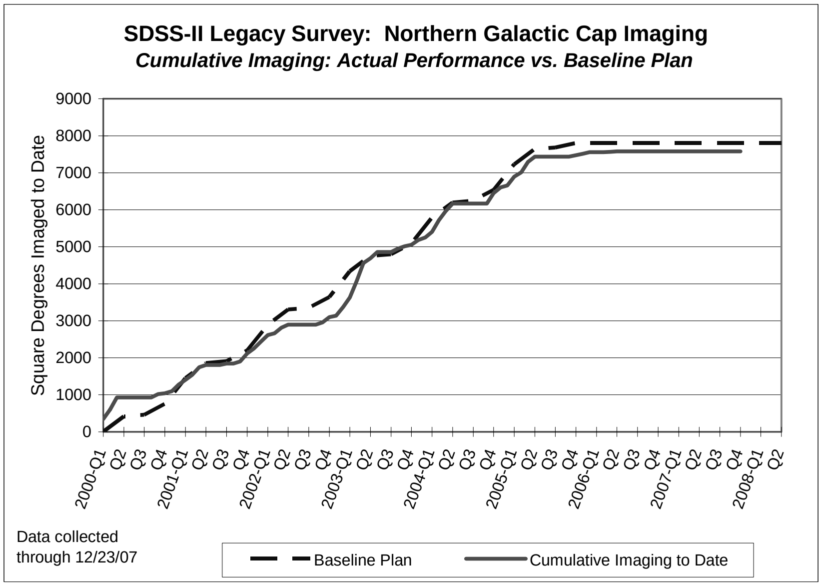


Figure 2.1 Imaging Progress against the Baseline Plan – Legacy Survey

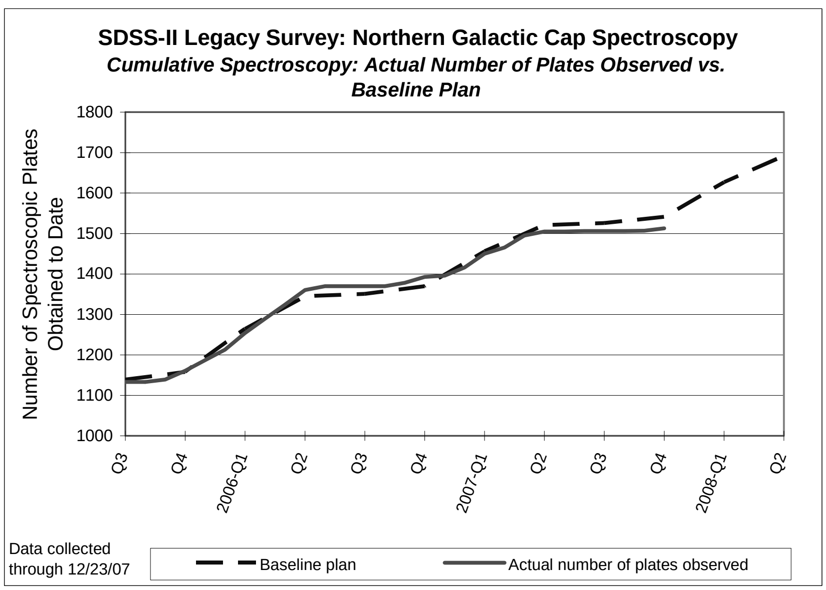


Figure 2.2 Spectroscopic Progress against the Baseline Plan – Legacy Survey

2.2. SEGUE Survey

Table 2.2 compares SEGUE progress against the baseline plan.

Table 2.2 SEGUE Survey Progress in 2007-Q4

	2007-Q4		Cumulative through Q4	
	Baseline	Actual	Baseline	Actual
SEGUE Imaging (sq. deg)	435	60	3320	3279
SEGUE Spectroscopy (bright plates)	18	18	154	143
SEGUE Spectroscopy (faint plates)	18	19	154	130

A few short SEGUE imaging segments to fill in holes were obtained for a total of 38 square degrees of SEGUE imaging. To date, SEGUE has obtained approximately 3300 square degrees of imaging (effectively complete for science purposes). There are two remaining small holes which will be filled in next quarter.

A total of 37 SEGUE plates (18 bright and 19 faint, corresponding to 56 plate-equivalents) were completed. This is roughly equivalent to completing 18.5 SEGUE tiles, against a baseline goal of 18 tiles. Recall that a SEGUE tile is considered complete when the faint and bright plate combination for a field is observed. The SEGUE Survey is behind the spectroscopic baseline goals for bright and faint plates due to marginal weather conditions.

Figure 2.3 shows the current SEGUE layout and progress map, as of January 2008. The plot can be found online at: http://segue.uchicago.edu/skycoverage.html

Jan 2008

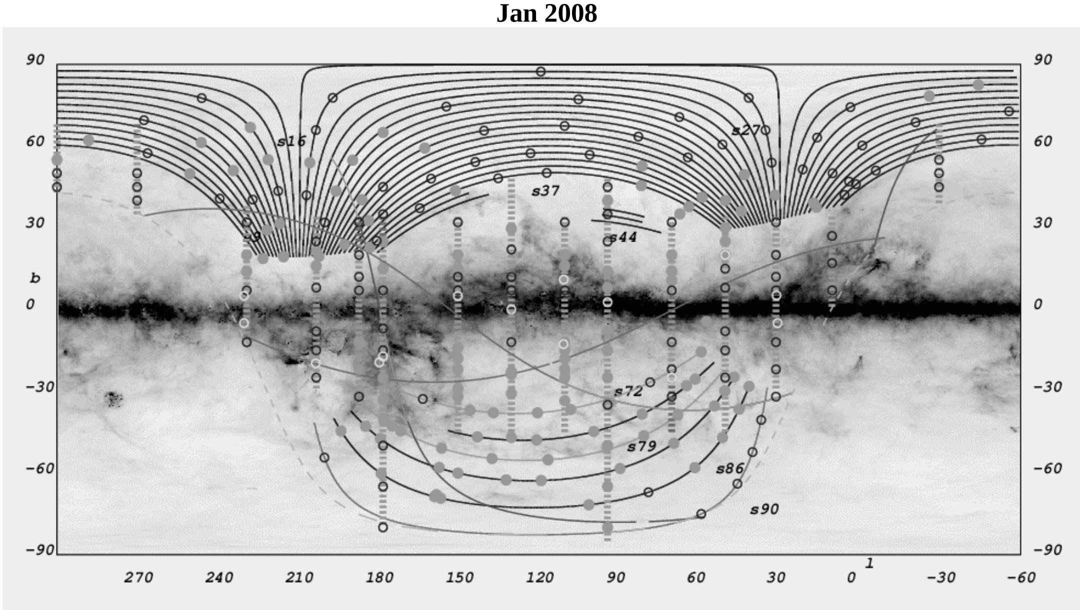


Figure 2.3 SEGUE Imaging Sky Coverage and Plate Layout (as of January 2008).

Figures 2.4 and 2.5 illustrate SEGUE progress against the baseline plan. The imaging graph presents a straightforward comparison of imaging progress against plan. The spectroscopy graph shows the rate at which we are completing bright and faint plates separately.

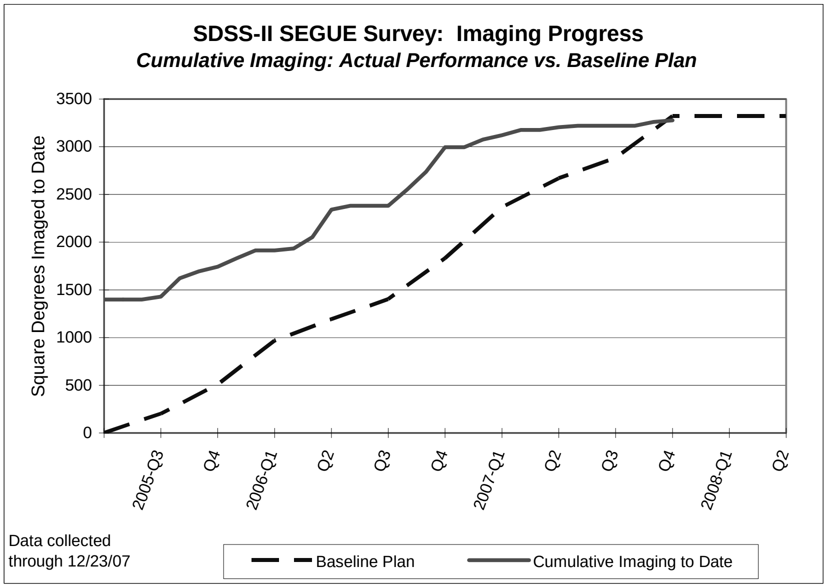


Figure 2.4 Imaging Progress against the Baseline Plan – SEGUE Survey

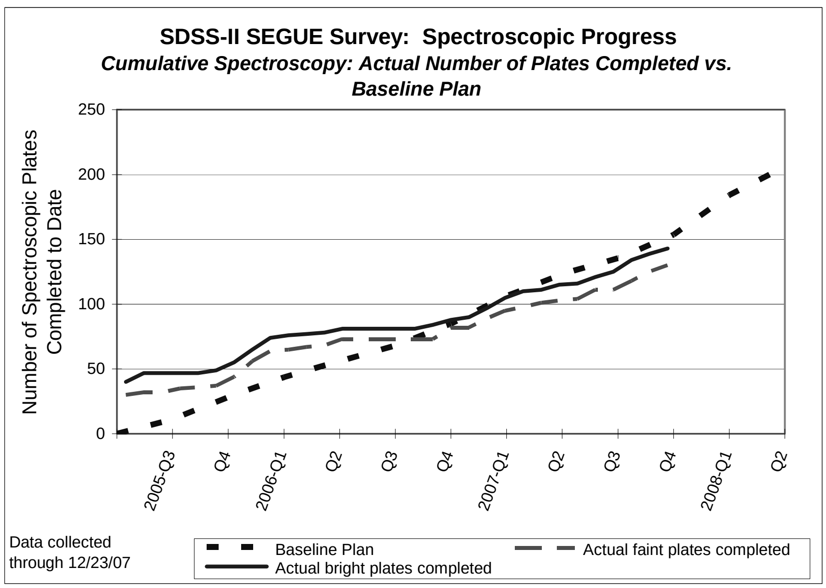


Figure 2.5 Spectroscopic Progress against the Baseline Plan – SEGUE Survey

We continue to prioritize the remaining SEGUE plates and make use of all available time (including bright moon time) in order to meet our science goals and come as close as possible to finishing the original SEGUE baseline survey by July 14, 2008.

2.3. Supernova Survey

The Supernova Survey completed its third and final observing season in Q4 2007, carrying out repeat imaging on stripe 82 to rapidly identify supernova candidates and target them spectroscopically. During October and November, approximately 162 supernovae were spectroscopically confirmed, including 123 type Ia supernovae, on follow-up telescopes. All confirmed supernova discoveries were promptly announced publicly on the web and through

Central Bureau Electronic Telegram (CBET) circulars. Over the entire fall 2007 season, 171 type Ia supernovae were confirmed. The total count of spectroscopically confirmed type Ia supernovae for the three-season survey (2005, 2006 and 2007) is 498.

As of this writing, seven papers using and/or describing SDSS SN data have been submitted for publication in refereed journals, and three of those have been published. The others are being modified in response to favorable referee reports. Another nine papers are in various stages of gestation.

2.4. Photometric Telescope

The Photometric Telescope (PT) observed 58 secondary patch sequences during Q4. Of these, 43 were deemed survey quality after processing and 15 were declared bad. The PT also observed 2,438 manual target sequences over this time period; of these, 117 were classified as survey quality and 2,321 were classified as non-survey quality, although this latter designation is somewhat misleading. Nearly all these 2,321 bad manual target sequences were either part of a planetary nebulae program which uses a non-SDSS filter and thus required special processing, not part of standard operations, or part of an extra-solar planet transit program or the ROTSE supernova follow-up program, neither of which require photometric conditions.

3. OBSERVING EFFICIENCY

Observing efficiency is summarized according to the categories used to prepare the baseline projection.

3.1. Weather

Table 3.1 summarizes the amount of time lost to weather and Figure 3.1 plots the fraction of suitable observing time against the baseline forecast. Averaged over the quarter, the fraction of available observing time was better than predicted in the baseline plan. Weather significantly reduced observing time toward the end of the December run and resulted in a lost night in good weather when ice caused damage to the enclosure power rails. Observable time was 43% in December after being 77% and 82% in October and November respectively.

Table 3.1 Potential Observing Hours Lost to Weather in Q4

Observing Condition	Total hours potentially available for observing	Total hours lost to weather	Fraction of time suitable for observing	Baseline Forecast
Dark Time	491	165	66%	60%
Dark & Gray Time	844	295	65%	60%

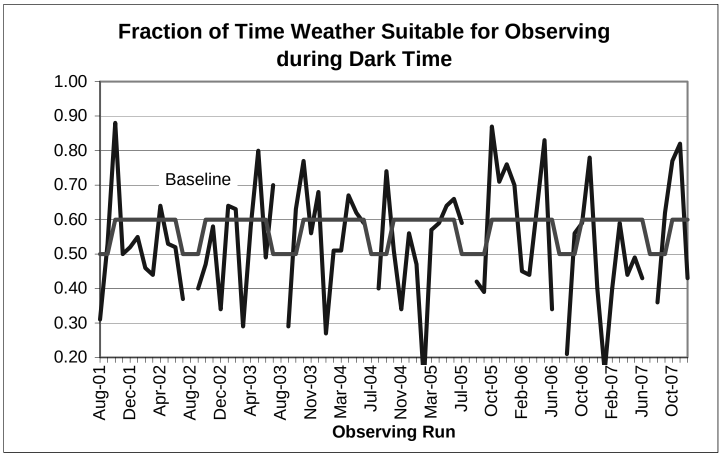


Figure 3.1 Percentage of Time Weather Suitable for Observing

3.2. System Uptime

System uptime measures the availability of equipment when conditions are suitable for observing. Table 3.2 summarizes the total amount of time lost to equipment or system problems and Figure 3.2 plots uptime against the baseline goal. System uptime was 99% in October and November then dropped to 84% in December when we lost over 26 hours due to problems.

Table 3.2 Potential Observing Hours Lost to Problems in Q4

Observing Condition	Total hours potentially available for observing	Total hours lost to problems	System Uptime	Baseline Forecast
Dark Time	491	29	94%	90%
Dark & Gray Time	844	35	96%	90%

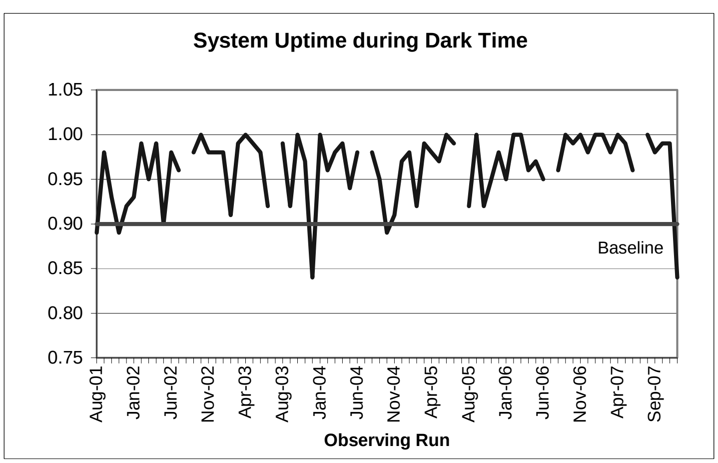


Figure 3.2 System Uptime

3.3. Imaging Efficiency

Imaging efficiency averaged 86% over the quarter, which is the baseline goal. Imaging efficiency was high in October and November due to the long length of the supernova runs. Imaging efficiency was below normal in December due to the shortness of the few runs that were made. Shorter runs tend to drive down efficiency because setup and calibration time reflect a larger fraction of the total time spent per scan.

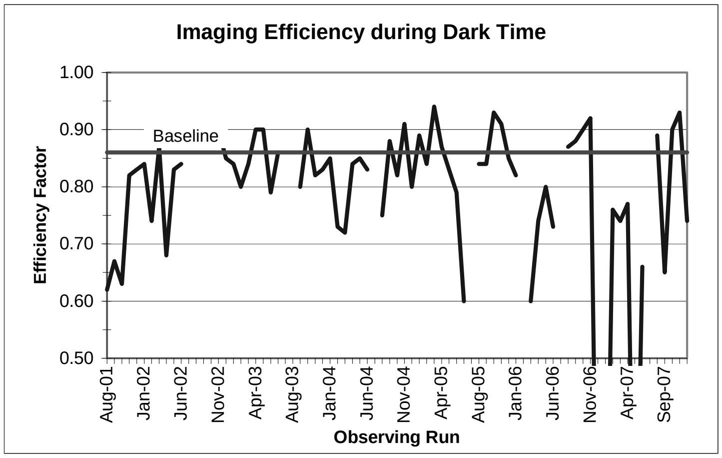


Figure 3.3 Imaging Efficiency

3.4. Spectroscopic Efficiency

Spectroscopic efficiency is derived by assessing the time spent performing various activities associated with spectroscopic operations. Table 3.3 provides the median time, by dark run, for various overhead activities associated with spectroscopic operations. Units for all categories are minutes except for efficiency, which is given as the ratio of baseline science exposure time (45 minutes) to total time required per plate. Using these measures, spectroscopic efficiency was below baseline goals; average efficiency in Q4 was 61% against the baseline goal of 64%. A problem with the secondary motion control system reduced efficiency for a few days in December. Setup and calibration minutes increased after shutdown due to a change in procedure for observing segue plates.

Table 3.3 Median Time for Spectroscopic Observing Activities

Category	*Baseline*	*Run starting Oct 6*	*Run starting Nov 7*	*Run starting Dec 7*
Instrument change	10	5	5	5
Setup	10	7	11	10
Calibration	5	11	11	11
CCD readout	0	3	3	3
Total overhead	25	26	30	29
Science exposure (assumed)	45	45	45	45
Total time per plate	70	71	75	74
Efficiency	0.64	0.63	0.60	0.61

Figure 3.4 plots spectroscopic efficiency over time.

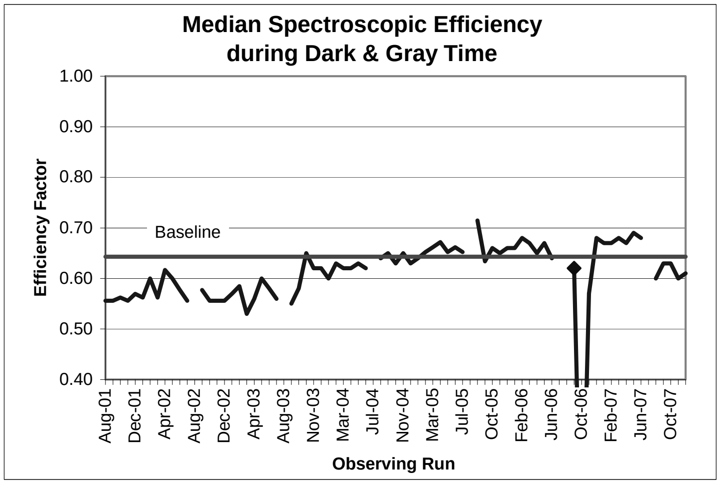


Figure 3.4 Spectroscopic Efficiency

4. OBSERVING SYSTEMS

Observing systems includes the instruments, telescopes, computers and various sub-systems that support observing operations at APO.

4.1. The Instruments

We began the quarter by replacing the slithead door actuators on the spectrographs. The seals on the pneumatic cylinder pistons had worn to the point that the blow-by was causing trouble with the actuator controller.

We also focused effort on getting the imager calibrator running with improved reliability. First we had to rework the mechanicals and enclosure. Once this was done, we started work on the control and communication systems. This work will continue into the first quarter of 2008.

The ET instrument enclosure was disassembled and the instrument shipped back to the University of Florida. The break-down and removal of the ET enclosure and instrument gave us back our full space in the plug lab.

4.2. The 2.5m Telescope

We experienced a few problems related to telescope and enclosure operations. We discovered that the silicone adhesive used on the M2 mirror failed on two of the Heidenhain flexure pucks; the wear on the power rail shoes was more extensive than we forecasted; and the altitude fiducials did not work properly.

One of the altitude fiducials, the 45° or #3 fiducial, did not work reliably; it would read out properly when the telescope moved in one direction but not the other. Although this did not cause complete failure or even diminish operational efficiency, the system is nonetheless not working properly. We will continue to diagnose and troubleshoot the system until the problem is resolved.

We experienced a PLC/CPU failure in the interlocks end rack in the 3rd quarter and replaced it with a spare unit. A new CPU unit was ordered, and it arrived this quarter. We tested it against the failed unit and confirmed that the old CPU unit had indeed failed. The new CPU unit has been added to the spares pool.

Investigations of the locking ring for the SP1 Blue Camera Focus Ring indicated previous damage. We were able to remove it and fabricate a new one from aluminum. We are in the process of fabricating a new brass one with axially mounted set screws to eliminate the need to rotationally move the lock ring in the future.

The 2.5-m primary mirror astigmatism controller stopped working part way through the quarter. Fortunately, we were able to keep the telescope operational during diagnosis and repair. We performed several bench tests and were unable to conclusively determine the root of the problem. However, when the controller was reinstalled onto the telescope, the astigmatism controller system started working as designed. We suspect the problem was caused by an air leak.

Two of the M2 Actuator Heidenhain Flexure pucks, which are glued to the backside of the M2 mirror, came unglued during the quarter. New adhesive was ordered and the pucks were re-bonded to the M2 mirror. However, there is a distinct possibility of additional glue joint failures, since we use this same adhesive in all our attachment points to glass surfaces. We will monitor to reduce our risk of a similar failure at another interface.

Severe icing on the enclosure power rails caused shoe failure and breakage when we attempted to open the enclosure shortly after an ice storm. During the repair work the next day, we discovered that the wear on the shoes was far worse than expected. We have added a maintenance task to replace these shoes at least once every 2 years.

In Q1 2008, we will begin a concentrated effort to complete documentation work for the SDSS-II closeout. We will need to perform further work on the imager calibrator so that we can collect data for a closeout calibration.

4.3. The Photometric Telescope

We had problems with the Photometric Telescope dome slit, as a result of a bent limit switch stop bracket. The bent bracket allowed the limit to be surpassed, which allowed the slit rollers to fall off their guides. A new stop ramp was fabricated and positioned a little further forward, effectively eliminating future recurrences of this problem.

4.4. Operations Software and the Data Acquisition System

The observing software and DA system were stable over the quarter. No changes were made to either system.

4.5. Observatory Operations

October and November were the final months of the Supernova project, and much of the observing done during this time was imaging of the equatorial stripe for this program. In December, the majority of time was spent on SEGUE and Legacy spectroscopy. In addition to SDSS-II observing and periodic instrument and telescope calibrations and maintenance, the observers continued to provide near-real-time data quality assurance and made nightly decisions to acquire survey-quality data in the most efficient way possible. Bright time was given to SEGUE bright plate spectroscopy, MARVELS spectroscopy and Supernova program imaging. Observers also provided shakedown/shakeup and cloudy-night support of SDSS-II tests. On-site observing documentation and procedures were maintained and updated on a regular basis. Observers continued to obtain exoplanet transit timing observations, and observed white dwarf standard stars and planetary nebula candidates, all with the Photometric Telescope (PT). A new PT project was added in December: the follow-up of ROTSE-detected supernovae.

The observers continued to be involved in individual research and professional development projects, as time permitted. During the fourth quarter, these projects included:

- Galaxy morphology research to constrain dark matter models in galaxies.
- Stellar abundance modeling.
- Solar physics research (Bayesian image recognition in magnetograms).
- Improving spectroscopic observing efficiency by understanding signal-to-noise measurement biases in "Son-of-Spectro" the on-site S/N tool.
- Collaborating with Ukrainian astronomers on cataclysmic variables and oxygen abundances in SDSS galaxies.
- Continuing the search for Galactic halo planetary nebulae using the SDSS CAS, DAS and the PT.
- Monitoring Observer contributions to announced SDSS and SDSS-II discovery papers.
- Using the SDSS equatorial stripe co-added data to find red dwarfs.

Work continued on the support building extension. Construction is 80% complete, under roof and closed up. Drywall and interior and exterior finishing are in progress.

5. DATA PROCESSING AND DISTRIBUTION

5.1. Data Processing

5.1.1. Software Development and Testing

The principal effort in Q4 has been on the development of improved imaging, spectroscopic, and SEGUE Stellar Parameters pipelines.

We continued to refine a new version of the Photometric pipeline, Photo, with more accurate sky subtraction near bright galaxies and stars. We also responded to a variety of bug reports including assertion failures and problems in PSF photometry. These refinements led to a detailed testing effort of the outputs of the new version of Photo. Separately, we have taken code which adds model galaxies to SDSS imaging data to test the biases in galaxy photometry as a function of magnitude and galaxy size.

We have written matching code which allows extensive tests of the difference in photometry between old and new versions of the pipeline. We have made extensive tests of photometry of bright galaxies, and the photometry of stars.

Early in Q1 2008, we will decide if the scientific advantages of this new version are sufficiently compelling to reprocess the complete set of imaging data for DR7.

We worked on incorporating the Pan-STARRS stellar photometry pipeline into Photo, using ubercalibration to calibrate it. A serious bug was found and fixed in the ubercal work.

We worked on refinements to the spectroscopic pipeline, idlspec2d. The code is now very close to the version needed for DR7. The refinements include:

- Improved templates for specBS;
- Improved wavelength calibration, using global solutions;
- Improved handling of sharp emission lines; and
- Improved flat fielding to properly handle changing features around the dichroic.

The Spectro pipeline was slightly modified to process bright moon plates without seriously affecting the wavelength solution. Testing of this change will continue in Q1 2008, but it appears to be a success.

In the upcoming quarter, we will focus on delivering a tested version of Spectro to be used in DR7 and plan further testing of the image processing code. We will also focus on processing data for DR7 and preparing documentation of all of the above.

Work continued by the JINA-MSU team on the development of the SEGUE Stellar Parameter Pipeline (SSPP). This resulted in a new improved version of the SSPP, which was run successfully on all plates at the end of December 2007. The new SSPP measures [Fe/H] and log g of all stars. We will load the latest SSPP results into the collaboration release version for DR7.

In the next quarter, we will begin reprocessing all plates through an improved version of spectro2d (idlspec2d) and SSPP.

5.1.2. Data Processing Operations at APO

We completed the third observing season of the Supernova Survey this quarter. The data collected were promptly reduced using the SN compute cluster at APO using essentially the software that we put in place before the 2005 run, augmented with upgrades in the SN filtering software that were put in place before the 2006 run. The on-mountain processing went very smoothly and was able to keep up with the data flow.

5.1.3. Data Processing Operations at Fermilab

We continued processing data from Q3 and new data as they arrived. We processed seven SEGUE runs covering 197 square degrees and 41 supernova runs covering 3,025 square degrees. We also processed 46 spectroscopic plates.

We implemented the infrastructure necessary to run the SEGUE Stellar Parameter Pipeline on the Fermilab computing grid, and ran all existing spectroscopic data through this pipeline.

We ran and evaluated a new version of the photometric pipeline. This included:

- installing new versions as they were delivered by the developer,
- finding and reporting bugs that interfere with incorporation into Fermilab operations,
- developing the infrastructure necessary to run the new version and the stable version simultaneously,
- benchmarking the time and resources required in order to understand how long a complete reprocessing of everything would take, and
- examining the science results.

During Q1 2008, we will be running sample data through the new imaging pipeline, in addition to processing all new data as they are acquired.

5.2. Data Distribution

Data distribution activities were focused on supporting existing releases and preparing for the first collaboration release of DR7.

5.2.1. Data Usage Statistics

Through December, the general public and astronomy community have access to the EDR, DR1, DR2, DR3, DR4, DR5 and DR6 through the DAS and SkyServer interfaces. In addition, the collaboration has access to the Runs DB.

Figure 5.1 plots the number of web hits we receive per month through the various SkyServer interfaces. In Q4 we recorded an average 12 million hits per month, compared to an average 22.2 million hits per month in Q3. Usage in Q3 was unusually high due to the announcement of data release six and the launch of Galaxy Zoo.

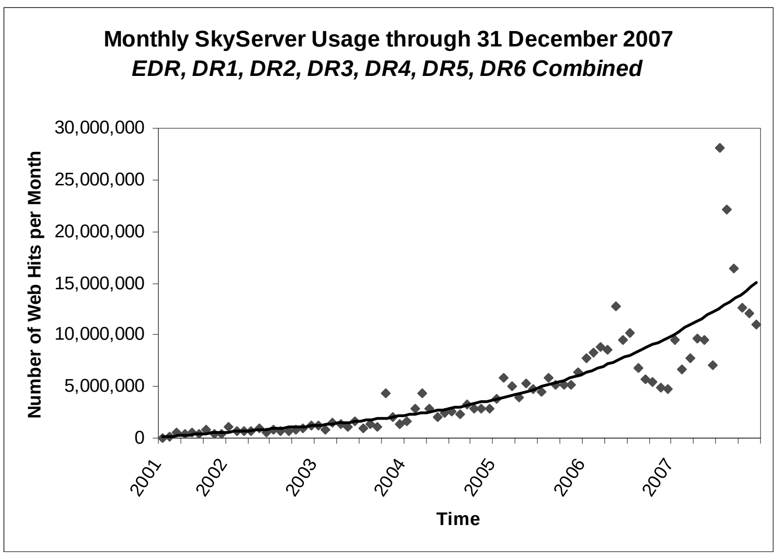


Figure 5.1 SkyServer usage per month, for all public releases combined.

Figure 5.2 shows the total number of SQL queries executed per month. We executed an average 2.3 million queries per month in Q4, compared to an average 2.7 million queries per month in Q3.

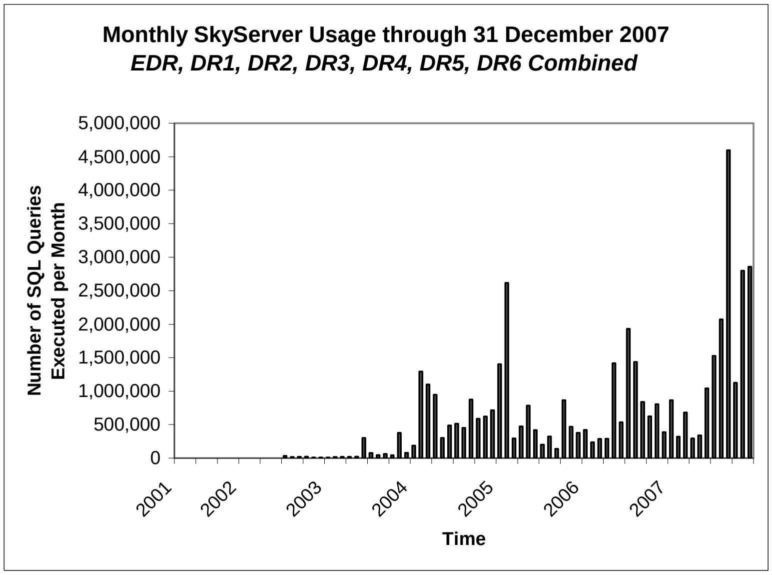


Figure 5.2 SkyServer usage, measured by the number of SQL queries submitted per month.

Through December 31, 2007, the SkyServer interfaces have received over of 364 million web hits and processed over 43 million SQL queries. Over the past quarter, the SkyServer sites received a total of 35.9 million hits and processed 6.8 million SQL queries.

Figure 5.3 shows the volume of data transferred monthly from the DAS through the rsync server. A total of 8.2 TB of data were transferred via rsync in Q4 compared to 14.4 TB in Q3. As we have seen in the past, the volume of data transferred varies significantly from month to month. By month the amount of data transferred were 2.7 TB in October, 4.9 TB in November, and 0.6 TB in December.

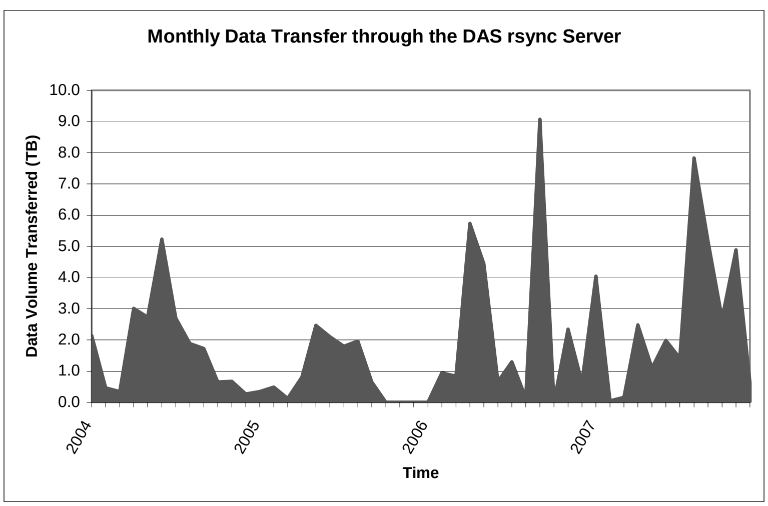


Figure 5.3 Monthly volumes of data transferred via the DAS rsync Server.

Figure 5.4 shows the volume of data transferred monthly through the DAS web interface. A total of 20.2 TB of data were transferred via the web interface in Q4, compared to 22.1 TB in Q3. By month the amount of data transferred were 4.6TB in October, 4.7TB in November, and 10.9.TB in December.

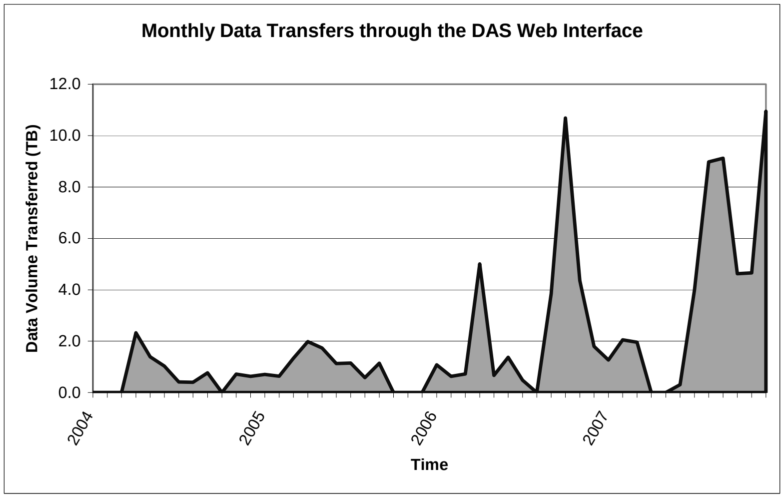


Figure 5.4 Monthly volume of data transferred via the DAS web interface.

5.2.2. Data Archive Server

We have started the process of preparing the DAS for long-term stewardship. We are studying what problems need to be resolved, and ways to economically improve reliability and maintainability, and designing possible solutions.

We completed the transfer of the help desk responsibilities from Fermilab to the University of Chicago Crerar Library. The Library will be the primary recipient and responder for all helpdesk queries received from the SDSS website, DAS, CAS, SkyServer, etc. Participants in the collaboration continue to respond to questions for which they are the most appropriate responders.

5.2.3. Catalog Archive Server

Work on the Catalog Archive Server (CAS) included addressing problem reports, and providing general support for data distribution operations. A total of six problem reports filed through the SDSS Problem-Reporting Database were fixed and closed, including one filed as critical/high against CasJobs.

We tested and deployed an enhanced version CasJobs, v3_3_7, on our production sites. Further refinements are being made to CasJobs and an upgraded version will be tested in Q1 2008.

As part of our long-term stewardship and archiving plan, we began operating mirror sites of the DR5-CAS and SkyServer at the University of Chicago and John Hopkins University in Q4.

5.2.4. Data Release 7

We defined the content for the first DR7 collaboration data release, including defining plate lists and chunks.

5.2.5. Runs Database

An expanded version of the runsDB was made available to the collaboration on December 21, 2007. It is about 25% bigger than the previous release. The new runsDB includes several SEGUE imaging runs previously not available.

The runsDB now contains a total of 486 runs, including repeats and stripe 82 runs. There are now 304,520,607 objects in the primary star table and 944,836,241 objects in the photoObjAll table.

The Match table in the new runs DB is still incomplete, as the algorithm to improve scaling for such a large number of objects is still being worked on by the database developers. There is a neighbors table available. RunQA information is in progress, but not yet present for all 116 new runs.

The old (370 run) runsDB is still available. It includes several runs on stripe 82 which have starting points at RA < 311 degrees (which was the previous pre-SN starting point of stripe 82). We now have runs which start at RA ~ 290.

Several more SEGUE runs are still to be added to the runsDB before the second DR7 collaboration release. It is our intent to make the runsDB publicly available at the time of the final public data release.

6. SURVEY PLANNING

6.1. Observing Aids

Several programs are used to aid in planning and carrying out observations; no changes were made to these in Q4.

6.2. Target Selection

For this quarter, 42 plates were designed and drilled in one drilling run. Of these, one plate was for the Legacy program (filling in a hole in the Southern survey area), 15 were regular SEGUE plates, 15 were faint SEGUE plates, 10 plates were test plates for the MARVELS program in SDSS-III, and one plate was a test plate for SDSS-III (that is not intended for observing).

6.3. Survey Planning

The split of time between the Supernova program and the SEGUE program continued through October and November. SEGUE was guaranteed two nights of observing in October and one night in November. In addition, during October, the excess observing time not used by the Supernova program was assigned to SEGUE at the beginning of the night, not the end as was done in previous years. This plan allowed SEGUE to obtain additional plates in a portion of sky that is otherwise difficult to observe due to the summer shutdown and the otherwise near-continuous observing cycle of the Supernova program.

The MARVELS plates were scheduled for observing during times when no other high priority survey plates could be observed, either due to bright moon or exhaustion of all plates during certain times of the night.

7. EDUCATION AND PUBLIC OUTREACH

We continued work on modifying some of the exercises in SkyServer. The new exercise on stellar spectra was reviewed by high school teachers in November and December. Further re-writes are in progress.

We continued mentoring two teachers on the SDSS follow-up research projects. The teachers are preparing posters on their research to be given in January at a Murdock Charitable Trust meeting in San Diego.

We gave a talk on SkyServer, Galaxy Zoo and Sky in Google Earth at the December meeting of the Northwest Teaching Exchange of the Center for Astronomy Education held in Everett WA. The Teaching Exchange is a group of college and high school educators who teach astronomy survey courses. Galaxy Zoo and SkyServer bookmarks were distributed at the meeting.

We began discussions about how to use Stripe 82 data in education projects. We will consult with a group of astronomers, with experience working with transient events, who have a seminar at UW regarding possibilities.

We continued working with Google to improve the education content and activities on Sky in Google Earth.

The Stars and Spectra exercise for SkyServer should be ready for release during the first quarter of 2008. The last step is to write a Teachers Guide for the exercise. The teachers who provided advice on this exercise will use it in their astronomy classes and provide us feedback.

We are planning to attend the SDSS session proposed for the National Science Teachers Association meeting in Boston next quarter.

Starting in January, we will be encouraging SDSS scientists who have done EPO projects or activities to submit poster papers to the joint AAS-ASP meeting in St. Louis in June 2008. The idea is to have the SDSS posters presented together in order to raise the visibility of how astronomers can use SDSS in education.

In January, we will start a brainstorming effort among consortium members to generate ideas on how SDSS EPO can participate in the International Year of Astronomy in 2009.

8. COST REPORT

The operating budget that the Advisory Council accepted and the Board of Governors approved for the period January 1 through December 31, 2007 consists of $720K of anticipated in-kind contributions from Fermilab, the University of Chicago (UC), the Johns Hopkins University (JHU), the University of Washington (UW), and the Joint Institute for Nuclear Astrophysics (JINA); and $4,856K for ARC-funded cash expenses.

Table 8.1 shows actual cost performance for ARC-funded cash expenses in Q4. More complete tables comparing actual to baseline performance are included in the appendices of this report. Exhibit 1 compares cash expenses to the budget by quarter and annually. Exhibit 2 compares actual in-kind contributions to the budget by quarter and annually.

Table 8.1 Q4 Cash Expenses and Forecast for 2007 ($K)

Category	2007 – 4th Quarter		2007 Operations Budget Total *(for the period Jan-Dec 2007)*	
	Baseline Budget	Actual Expenses	Baseline Budget	Actual Expenses
1. Survey Management	91	82	477	415
2. Survey Operations				
2.1. Observing Systems	163	162	702	653
2.2. Observatory Operations	433	453	1,732	1,703
2.3. Data Processing	175	207	722	730
2.4. Data Distribution	90	142	491	466
2.5. ARC Support for Survey Ops	4	2	32	6
3. New Development				
3.1. SEGUE Development	24	37	151	130
3.2. Supernova Development	0	0	0	0
3.3. DA Upgrade	0	0	0	0
3.4. Photometric Calibration	24	28	94	73
4. ARC Corporate Support	8	8	44	71
Sub-total	1,011	1,122	4,446	4,248
5. Management Reserve	103	0	410	0
Total	1,114	1,122	4,856	4,248

8.1. Q4 Performance - In-kind Contributions

The sum of in-kind contributions in Q4 was $150K against the baseline budget of $172K. For the year, contributions were $710K, or $10K (1%) below the baseline budget of $720K. In-kind contributions were provided by Fermilab, JHU, and UW, as follows:

- Fermilab provided support for survey management, data processing and data distribution activities. Effort was also provided to support oversight, planning, and development work for the SEGUE and Supernova projects. The level of in-kind effort required from Fermilab was less than budgeted.
- JHU provided support for the development, loading and hosting of databases associated with the CAS, CasJobs, and SkyServer. The level of support provided was greater than planned.
- UW contributed the overhead associated with the plate drilling operation as anticipated.

8.2. Q4 Performance – ARC Funded Cash Expenses

ARC-funded expenses in Q4 were $1,122K, or $111K (11%) above the budget of $1,011K, before management reserve. A number of factors contributed to the large overrun, including increased effort on software development; some higher than anticipated salary and utility costs; and the costing of expenses in Q4 that had been budgeted for earlier in the year. Although Q4 expenses exceeded the Q4 forecast, actual costs for the year as a whole were well within the annual budget. Specifically, total expenses for the year were $4,248K, or $198K (4%) below the baseline budget of $4,446, before management reserve.

Survey Management costs were $82K against a budget of $91K. Expenses to support the ARC Business Manager and the ARC EPO Coordinator were as anticipated. Expenses for the ARC Secretary, project management support staff, the public affairs office and support for the young astronomers travel fund were higher than anticipated. All other survey management costs were less that anticipated. For the year, the total expenses for Survey Management were $415K, or $62K (13%) below the baseline budget of $477K.

Observing Systems costs were $162K against a budget of $163K. Fermilab costs were higher than budgeted due to delayed billing of contract machine shop services procured during the summer shutdown. Princeton, UW and ARC observing systems support costs were less than anticipated. For the year, the total expenses for Observing Systems were $653K, or $49K (7%) below the baseline budget of $702K.

Observatory Support costs were $453K against a budget of $433K. NMSU personnel and utility expenses were higher than anticipated when the baseline budget was prepared. For the year, total Observatory Support expenses were $1,703K, or $29K (2%) below the baseline budget of $1,732K.

Data Processing costs were $207K against a budget of $175K. Fermilab and Princeton expenses were greater than budgeted because extra effort was given to the development and testing of a new Photo code. For the year, the total cost for Data Processing was $730K, or $8K (1%) above the baseline budget of $722K.

Data Distribution costs were $142K against a budget of $90K. FNAL expenses were in line with expectations. JHU expenses were higher than budgeted due to equipment expenses occurring later than planned and accounting reconciliation of 2007 personnel expenses. Expenses for data distribution computer hardware at JHU were budgeted for in Q3, but were not actually costed until Q4. For the year, the total cost for Data Distribution was $466K or $25K (5%) below the baseline budget of $491K.

ARC Support for Survey Operations costs were $2K against a budget of $4K. The total cost for Survey Operations support was $6K, or $26K (81%) below the baseline budget of $32K.

Expenses associated with development work for the SEGUE Survey were $37K against a budget of $24K. Expenses for software development work at the University of California Santa Cruz were budgeted in the first half of the year but did not begin until the Q3. For the year, the total cost was $130, or $21K (14%) below the baseline budget of $151K.

Expenses associated with photometric calibration efforts at Princeton were $28K against a budget of $24K. For the year, the actual expenses were $73K, or $21K (23%) below the baseline budget of $94K.

Miscellaneous ARC corporate expenses (i.e., audit fees, bank fees, petty cash, and APO trailer rentals) were at the budget of $8K. For the year, the total cost was $71K, or 27K (63%) higher than the baseline budget of $44K. The overrun for the year is largely due to the Q2 purchase of a Bobcat tractor at APO, which was unanticipated when the baseline budget was prepared. The share of the cost charged to the SDSS-II project was $23K.

8.3. Q4 Performance - Management Reserve

No management reserve funds were expended in Q4.

9. PUBLICATIONS

In Q4, there were seven papers based on SDSS data that were published by members of the SDSS collaboration. There were also 116 papers published by individuals outside of the collaboration, using publicly available data. Exhibit 3 lists papers published by members of the SDSS Collaboration; Exhibit 4 lists papers published by individuals outside of the SDSS collaboration.

The SDSS-II project reached another milestone in Q4. Many astronomers are familiar with the concept of an individual's (or in our case, a project's) h number, which is the number h of publications one has with h or more citations. SDSS has just hit h=100 (i.e., 100 papers with 100 or more citations), as can be seen by looking at the tabulation of refereed papers with 'SDSS' or Sloan survey' in their title or abstract: see http://tinyurl.com/42jxy. Looking at this shows that we have 41 papers with more than 200 citations, and 251 papers with more than 50 citations. There are 1674 papers in total, cited a grand total of 55,551 times as of 11 December 2007.

Exhibit 1 CY2007 Cash Expenses ($000s)

SDSS-II CY2007 Cost Performance as of December 31, 2007

		Inst	Qtr 1 Jan-Mar Actual Expenses	Qtr 2 Apr-Jun Actual Expenses	Qtr 3 Jul-Sep Actual Expenses	Qtr 4 Oct-Dec Approved Baseline Budget	Qtr 4 Oct-Dec Actual Expenses	Qtr 4 Oct-Dec Variance (%)	CY2007 Total Approved Baseline Budget	CY2007 Total Actual Expenses	CY2007 Total Variance (%)
OPERATIONS BUDGET - CASH EXPENSES											
1.0 Survey Management											
SSP-221	ARC Secretary/Treasurer	ARC	2	2	2	4	6	-48%	12	13	-12%
SSP-234	ARC Business Manager	ARC	16	17	19	18	17	3%	69	69	0%
SSP-246	PU Office of the Project Scientist	PU	.2	.1	61	3	1	80%	73	62	15%
SSP-248	FNAL Support for Survey Management	FNAL	13	19	22	14	25	-76%	58	80	-39%
SSP-267	UC Support for Survey Management	UC	16	18	33	14	12	15%	79	80	-2%
SSP-270	UW Support for EPO Coordinator	UW	10	12	16	11	5	52%	48	43	10%
SSP-274	PU Support for EPO (NSF REU)	PU	0	0	0	0	0	---	0	0	-----
SSP-291A	ARC Support for Public Affairs	ARC	17	7	0	0	4	---	16	29	-85%
SSP-291B	ARC Support for Spokesperson	ARC	1	0		3	1	66%	10	3	72%
SSP-291C	ARC Support for Collaboration Affairs	ARC	3	12	2	16	2	89%	64	18	71%
SSP-291i	ARC Support for Public Information Officer	ARC	4	2	2	8	2	76%	31	9	69%
SSP-291K	ARC Support for Young Astronomers Travel Fund	ARC	2	0	0	0	7	---	0	9	-----
SSP-291L	ARC Support for EPO Webmaster and Teacher	ARC	0	0	0	0	0	---	20	0	100%
	Survey Management Sub-total		**85**	**89**	**158**	**91**	**82**	7%	**477**	**415**	13%
2.0 Survey Operations											
2.1 Observing Systems											
SSP-231	UW Observing Systems Support	UW	30	45	54	43	37	14%	168	166	1%
SSP-232	PU Observing Systems Support	PU	12	11	12	12	11	4%	49	46	7%
SSP-242	FNAL Observing Systems Support	FNAL	92	76	72	92	101	-10%	368	342	7%
SSP-261	FNAL Data Acquisition System Support	FNAL	6	1	1	6	3	52%	27	11	61%
SSP-291D	ARC Observing Systems Support	ARC	36	23	21	10	9	8%	89	89	0%
	Observing Systems Sub-total		176	156	160	163	162	1%	702	653	7%
2.2 Observatory Support											
SSP-235	NMSU Site Support	NMSU	383	439	409	418	439	-5%	1,698	1,670	2%
SSP-272	JHU Support for APO Site Management	JHU	0	5	15	15	15	2%	34	34	---
	Obseratory Support Sub-total		383	444	424	433	453	-5%	1,732	1,703	2%
2.3 Data Processing											
SSP-240	FNAL Software and Data Processing Support	FNAL	98	116	132	117	122	-4%	516	467	10%
SSP-238	PU Software and Data Processing Support	PU	42	45	49	40	50	-27%	159	186	-17%
SSP-239	UC Software and Data Processing Support	UC	8	9	26	18	35	-91%	47	78	-65%
	Data Processing Sub-total		147	170	206	175	207	-18%	722	730	-1%
2.4 Data Distribution											
SSP-268	FNAL Data Distribution Support	FNAL	110	54	102	67	65	3%	395	331	16%
SSP-237	JHU Data Archive Development and Support	JHU	6	15	36	24	78	-231%	95	135	-42%
SSP291M	ARC Support for Data Distribution	ARC	0	0	0	0	0	---	1	0	100%
	Data Distribution Sub-total		116	70	138	90	142	-58%	491	466	5%
2.5 ARC Support for Survey Operations											
SSP91f	ARC Additional Scientific Support	ARC	1	0	0	0	0	---	18	1	97%
SSP91h	ARC Observers' Research Support	ARC	0	2	2	4	2	55%	14	6	60%
	Data Distribution Sub-total		1	2	2	4	2	55%	32	6	81%
	Survey Operations Sub-total		**822**	**842**	**929**	**865**	**966**	-12%	**3,680**	**3,559**	3%

Exhibit 1 CY2007 Cash Expenses (continued)

SDSS-II CY2007 Cost Performance as of December 31, 2007

			Qtr 1 Jan-Mar	Qtr 2 Apr-Jun	Qtr 3 Jul-Sep	Qtr 4 Oct-Dec			CY2007 Total		
		Inst	Actual Expenses	Actual Expenses	Actual Expenses	Approved Baseline Budget	Actual Expenses	Variance (%)	Approved Baseline Budget	Actual Expenses	Variance (%)
3.0 New Development											
3.1 SEGUE Survey Development											
SSP-138	PU SEGUE Software Development	PU	14	13	17	24	28	-17%	94	73	23%
SSP271	OSU Scientific Support	ARC	9	10	10	0	0	---	29	29	0%
SSP273	UCSC Scientific Support	ARC	0	0	19	0	9	---	28	28	0%
SSP-268	FNAL Data Distribution Support	FNAL	0		0	0		---	0	0	---
	SEGUE Development Sub-total		23	23	47	24	37	-57%	151	130	14%
3.2 Supernova Survey Development									0	0	---
	No allocation		0	0	0	0	0	---	0	0	---
	Supernova Development Sub-total		0	0	0	0	0	---	0	0	---
3.3 Data Acquisition System Upgrade											
	No allocation		0	0	0	0	0	---	0	0	---
	DA Upgrade Sub-total		0	0	0	0	0	---	0	0	---
3.4. Photometric Calibration Development											
SSP-138	PU Photometric Calibration Development	PU	14	13	17	24	28	-17%	94	73	23%
	Photometric Calibration Sub-total		14	13	17	24	28	-17%	94	73	23%
	New Development Sub-total		**36**	**37**	**64**	**48**	**65**	-37%	**245**	**202**	17%
4.0 ARC Corporate Support											
SSP291e	ARC Corporate Support	ARC	20	8	11	8	8	-10%	44	48	-10%
SSP291g	ARC Capital Improvements	ARC	0	23	0	0	0	---	0	23	---
	ARC Corporate Support Sub-total		**20**	**31**	**11**	**8**	**8**	-10%	**44**	**71**	-63%
Cash Budget Sub-total			**964**	**998**	**1,164**	**1,011**	**1,122**	-11%	**4,446**	**4,248**	4%
5.0 Management Reserve		ARC	0	0	0	103	0	100%	410	0	100%
TOTAL CASH BUDGET			**964**	**998**	**1,164**	**1,114**	**1,122**	-1%	**4,856**	**4,248**	13%

Exhibit 2 CY2007 In-Kind Contributions ($000s)

SDSS-II CY2007 Cost Performance as of December 31, 2007

		Inst	Qtr 1 Jan-Mar Actual Expenses	Qtr 2 Apr-Jun Actual Expenses	Qtr 3 Jul-Sep Actual Expenses	Qtr 4 Oct-Dec Approved Baseline Budget	Qtr 4 Oct-Dec Actual Expenses	Qtr 4 Oct-Dec Variance (%)	CY2007 Total Approved Baseline Budget	CY2007 Total Actual Expenses	CY2007 Total Variance (%)
OPERATIONS BUDGET: IN-KIND											
1.0 Survey Management											
SSP-248	FNAL Support for Survey Management	FNAL	27	23	18	36	25	32%	140	93	34%
	Survey Management Sub-total		**27**	**23**	**18**	**36**	**25**	32%	**140**	**93**	34%
2.0 Survey Operations											
2.1 Observing Systems											
SSP-231	UW Observing Systems Support	UW	15	15	15	15	15	0%	60	60	0%
	Observing Systems Sub-total		15	15	15	15	15	0%	60	60	0%
2.3 Data Processing											
SSP-239	UC Software and Data Processing Support	UC	0	10	10	5	0	100%	19	20	-1%
SSP-240	FNAL Software and Data Processing Support	FNAL	89	91	97	88	79	10%	342	356	-4%
SSP-269	MSU SEGUE Software Development and Support	MSU	0	0	0	0	0	---	0	0	---
	Data Processing Sub-total		89	101	106	93	79	15%	361	375	-4%
2.4 Data Distribution											
SSP-237	JHU Data Archive Development and Support	JHU	10	29	3	14	18	-30%	50	62	-24%
SSP-268	FNAL Data Distribution Support	FNAL	19	18	16	15	13	7%	56	67	-20%
	Data Distribution Sub-total		30	48	20	29	32	-11%	106	129	-22%
	Survey Operations Sub-total		**133**	**164**	**141**	**136**	**126**	8%	**527**	**564**	-7%
3.0 New Development											
3.1 SEGUE Survey Development											
SSP-237	JHU Data Archive Development and Support	JHU	0	22	0	0	0	---	22	22	0%
SSP-269	MSU SEGUE Software Development and Support	MSU	16	16	0	0	0	---	31	31	0%
	SEGUE Development Sub-total		16	37	0	0	0	---	53	53	0%
	New Development Sub-total		**16**	**37**	**0**	**0**	**0**	---	**53**	**53**	0%
TOTAL IN-KIND CONTRIBUTIONS			**177**	**224**	**159**	**172**	**150**	13%	**720**	**710**	1%
TOTAL OPERATING BUDGET (Cash and In-kind)			**1,140**	**1,222**	**1,323**	**1,286**	**1,272**	1%	**5,575**	**4,957**	11%

Exhibit 3 Papers from within the SDSS Collaboration

1. Correlation of CMB with Large-Scale Structure: II. Weak Lensing. Phys Rev D Submitted – Christopher Hirata

2. Correlation of CMB with Large-Scale Structure: I. ISW Tomography and Cosmological Implications. Phys Rev D Submitted – Shirley Ho

3. Interactions, Star Formation and AGN Activity. Monthly Notices Submitted – Cheng Li

4. Precision of Hubble Constant Derived Using Black Hole Binary Absolute Distances and Statistical Redshift Information from Galaxy Surveys. Phys Rev D Submitted – Chelsea MacLeod

5. Exploring the Variable Sky with the Sloan Digital Sky Survey. AJ 2007, 134, 2236-2251 – Branimir Sesar

6. On the Variability of Quasars: A Link between the Eddington Ratio and Optical Variability? MNRAS Accepted – B. Wilhite

7. The Effect of Variability on the Estimation of Quasar Black Hole Masses. ApJ 2007, 669, 791-800 – Brian C. Wilhite

Exhibit 4 Publications Based on Public Data

1. Astronomy: Sloan at Five. Nature 2007, 450, 488-489 – Robert C. Kennicutt, Jr.

2. Light Curves of Five Type Ia Supernovae at Intermediate Redshift. A&A Submitted – R. Amanullah

3. The History of Star-Forming Galaxies in the Sloan Digital Sky Survey. MNRAS 2007, 381, 263-279 – N. V. Asari

4. Bars in Disk-Dominated and Bulge-Dominated Galaxies at z~0: New Insights from ~3600 SDSS Galaxies. ApJ Accepted – Fabio D. Barazza

5. The Young and the Dustless: Interpreting Radio Observations of Ultraviolet-Luminous Galaxies. ApJS 2007, 173, 457-470 – Antara R. Basu-Zych

6. The Mean and Scatter of the Velocity Dispersion-Optical Richness Relation for maxBCG Galaxy Clusters. ApJ 2007, 669, 905-928 – M. R. Becker

7. The Cosmic Horseshoe: Discovery of an Einstein Ring around a Giant Luminous Red Galaxy. ApJL 2007, 671, L9-L12 – V. Belokurov

8. Active Galactic Nuclei with Double-Peaked Balmer Lines. I. Black Hole Masses and Eddington Ratios. ApJ 2007, 668, 721-729 – Wei-Hao Bian

9. Statistical Properties of the GALEX-SDSS Matched Source Catalogs, and Classification of the UV Sources. ApJS 2007, 173, 659-672 – Luciana Bianchi

10. Transformations between 2MASS, SDSS and BVRI Photometric Systems: Bridging the Near Infrared and Optical. MNRAS Accepted – S. Bilir

11. WMAP 3-yr Primordial Power Spectrum. MNRAS 2007, 381, 68-74 – M. Bridges

12. How Robust are the Constraints on Cosmology and Galaxy Evolution from the Lens-Redshift Test? New Journal of Physics, 9, 445, 2007 – Pedro R. Capelo

13. Environment and Mass Dependencies of Galactic λ Spin Parameter: Cosmological Simulations and Observed Galaxies Compared. MNRAS submitted – B. Cervantes-Sodi

14. The Galaxy Cross-Correlation Function as a Probe of the Spatial Distribution of Galactic Satellites. A&A submitted – Jacqueline Chen

15. Color Dependence in the Spatial Distribution of Satellite Galaxies. A&A Submitted – Jacqueline Chen

16. SDSSJ124155.33+114003.7 -- A Missing Link Between Compact Elliptical and Ultracompact Dwarf Galaxies. MNRAS Accepted – Igor V. Chilingarian

17. A Wide-Field View of Leo II: A Structural Analysis Using the Sloan Digital Sky Survey. AJ 2007, 134, 1938-1951 – Matthew G. Coleman

18. Active Galactic Nuclei in Void Regions. ApJ Submitted – Anca Constantin

19. The DEEP2 Galaxy Redshift Survey: the Role of Galaxy Environment in the Cosmic Star Formation History. MNRAS Accepted – Michael C. Cooper

20. The Arecibo Galaxy Environment Survey: II. A HI View of the Abell Cluster 1367 and its Outskirts. MNRAS Accepted – L. Cortese

21. Improved Photometric Calibrations for Red Stars Observed with the SDSS Photometric Telescope. AJ 2007, 134, 2430-2434 – James R. A. Davenport

22. The UV Continuum of Quasars: Models and SDSS Spectral Slopes. ApJ 2007, 668, 682-698 – Shane W. Davis

23. GALEX Ultraviolet Photometry of NGC 2420: Searching for WDs. arXiv:0712.0755 – C. De Martino

24. The Dependence of Galaxy Luminosity on Environment in a Volume-Limited Sample of the Main Galaxy Sample of SDSS DR6. ApJL 2007, 671, L101-L104 – Xin-Fa Deng

25. Local Environmental Dependence of Galaxy Properties in a Volume-Limited Sample of Main Galaxies. Chinese J Astr. Ap. 2007, 5, 639-648 – Xin-Fa Deng

26. The Main Galaxy Groups from the SDSS Data Release 5. A&A 2007, 474, 783-791 – Fa-Xin Deng

27. Testing Gravity with the CFHTLS-Wide Cosmic Shear Survey and SDSS LRGs. Phys Rev D Submitted – O. Doré

28. A Census of Metals and Baryons in Stars in the Local Universe. MNRAS Submitted – A. Gallazzi

29. Dark Matter Halos of Disk Galaxies: Constraints from the Tully-Fisher Relation. ApJ 2007, 671, 1115-1134 – Oleg Y. Gnedin

30. A Catalogue of Local E+A (Post-Starburst) Galaxies Selected from the Sloan Digital Sky Survey Data Release 5. MNRAS 2007, 381, 187-193 – Tomotsugu Goto

31. Ages and Abundances of Red Sequence Galaxies as a Function of LINER Emission-Line Strength. ApJ 2007, 671, 243-271 – Genevieve J. Graves

32. A New Sample of Low-Mass Black Holes in Active Galaxies. ApJ 2007, 670, 92-104 – Greene, Jenny E.

33. The Different Physical Mechanisms that Drive the Star Formation Histories of Giant and Dwarf Galaxies. MNRAS 2007, 281, 7-32 – C. P. Haines

34. The Galaxy Content of SDSS Clusters and Groups. ApJ Submitted – Sarah M. Hansen

35. Constraints on σ_8 from Galaxy Clustering in N-body Simulations and Semi-Analytic Models. MNRAS 2007, 382, 1503-1515 – Geraint Harker

36. Spatial Periodicity of Galaxy Number Counts from Fourier Analysis of the Large Scale Surveys of Galaxies in the Universe. arXiv:0711.4885 – John G. Hartnett

37. Clustering Properties of Rest-Frame UV-Selected Galaxies. II. Migration of Star Formation Sites with Cosmic Time from GALEX and CFHTLS. ApJS 2007, 173, 503-511 – Sébastie Heinis

38. Intrinsic Galaxy Alignments from the 2SLAQ and SDSS Surveys: Luminosity and Redshift Scalings and Implications for Weak Lensing Surveys. MNRAS 2007, 381, 1197-1218 – Christopher Hirata

39. Spiral Disk Opacity from Occulting Galaxy Pairs in the Sloan Digital Sky Survey. AJ 2007, 134, 2385-2397 – B. W. Holwerda

40. The Diverse Properties of the Most Ultraviolet-Luminous Galaxies Discovered by GALEX. ApJS 2007, 173, 441-456 – Charles G. Hoopes

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