

**Sloan Digital Sky Survey II**  
**2008 THIRD QUARTER REPORT**  
**July 1, 2008 – September 30, 2008**

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**Q3 PERFORMANCE HIGHLIGHTS**

- An international symposium called "The Sloan Digital Sky Survey: From Asteroids to Cosmology" was held in Chicago August 15 - 18. The meeting was attended by almost 200 researchers and students from numerous places. This was the final closing meeting of the SDSS, taking the place of both spring and fall collaboration meetings in 2008.
- The SDSS science plug plates that were used and stowed for the SDSS 1 and 2 surveys, approximately 2000 plates, were decommissioned and sold for scrap value.
- We completed the processing and loading of SEGUE imaging and spectra into the DR7.2 CAS and DAS.
- We reorganized the SDSS website for long-range use by adding content and combining the DR7 and SDSS.org websites into one site.
- We recorded 30.3 million hits on our SkyServer interfaces and processed 1.9 million SQL queries. We also transferred 2.8 terabytes of data through the Data Archive Server interfaces.
- SDSS has passed another milestone. Astrophysics Data System now lists over 2000 refereed papers with 'SDSS' or 'Sloan Survey' in their abstract or title. We passed the 1000-paper mark about 2.5 years ago so we are averaging well over one paper per day since then.
- Q3 cash operating expenses were \$613K against a baseline budget of \$796K before management reserve. In-kind contributions were \$142K against anticipated contributions of \$70K. No management reserve funds were expended.

## 1. SOME RECENT SCIENCE RESULTS

An international Symposium was held August 15 - 18 to celebrate the scientific accomplishments of the SDSS and SDSS-II, in recognition of the final collection of data for SDSS-II on July 14, 2008. The title of the symposium, "From Asteroids to Cosmology," indicates the enormous range of topics that have been investigated based on SDSS data. The sessions illustrate this feature as well: "Galaxies," "Quasars, Absorption Systems, and the Intergalactic Medium," "The Milky Way and its Neighbors," Stars," "Large-Scale Structure and Galaxy Clusters," "The Solar System," "Supernovae and Supernova Cosmology," and "The Near Future." The last session focused on new surveys that build upon the legacy of SDSS.

The program, including links to the papers, is available at <http://sdss2008.uchicago.edu/program.html>

The Symposium was organized with the Collaboration Council acting as the Scientific Organizing Committee, and the Kavli Institute for Cosmological Physics of the University of Chicago taking the lead on the Local Organizing Committee. The Symposium was supported in part by grants from the Sloan Foundation and the National Science Foundation.

Besides celebrating the range of SDSS science, the Symposium also highlighted the range of researchers. The SDSS has had an enormous influence on all aspects of astronomy, thanks to its public database. Half of the invited speakers were from non-SDSS institutions, and many of the attendees were similarly from non-SDSS institutions. Special effort was made to provide funding to enable students to travel and attend the meeting. We had 182 people in attendance, of which 50 were students.

## 2. SURVEY PROGRESS

The original scientific goals in terms of area covered and spectra obtained were achieved in Q2 for both Legacy and for SEGUE. New observations for both the Legacy and SEGUE surveys ended on July 14, 2008 and those results were reported with the Q2 actual.

### 2.1. Supernova Survey

During the third quarter of 2008, progress on processing and analyzing the supernova data both for use in science analysis and for public release continued. All supernova runs are available to the public on DRSN. Work continued on final photometric processing of confirmed supernovae from the 2007 run and final photometric processing of all interesting transients (about 10,000 objects) for all three seasons. In addition, we completed the gathering of spectroscopic follow-up data into a central database at Fermilab with exception of a few missing elements.

## 3. OBSERVING EFFICIENCY

Observing efficiency statistics through the end of the survey were captured in the Q2 report.

#### 4. OBSERVING SYSTEMS

Observing systems includes the instruments, telescopes, computers and various sub-systems that support observing operations at APO. These systems are now being used by ARC for SDSSIII operations and other ARC sponsored projects.

We completed our closeout activities for SDSS-II which included reviewing and updating the documentation on the telescope's operating and maintenance procedures, disposing of plug plates, transferring archived photos to CDs, copying videos for archives and preparing a property inventory list to be forwarded to the ARC Business Manager.

#### 5. DATA PROCESSING AND DISTRIBUTION

##### 5.1. Data Processing

##### 5.1.1. Software Development and Testing

The principal efforts in Q3 have been on documentation and testing of data products for the next data release. We completed processing the SEGUE imaging scans through both PHOTO and the Pan-STARRS image-processing code (psPhot). We worked further on definitions of quality of PHOTO and psPhot per field for the SEGUE imaging, and incorporated into CAS detailed field quality information.

In the upcoming quarter, essentially all our effort will be focused on documentation.

We continued our work with the SEGUE Stellar Parameter Pipeline (SSPP). We ran and loaded the latest SSPP results into DR7.2 CAS.

We completed the processing and loading of SEGUE imaging and spectra into the DR7.2 CAS and DAS. The SEGUE overview and target selection technical paper was submitted to the AJ on September 29, 2008.

##### 5.1.2. Data Processing Operations at APO

No data were processed at APO as we were not collecting new supernova data.

##### 5.1.3. Data Processing Operations at Fermilab

Using a list of imaging runs expected to be in the final data release, we generated a list of corresponding files that will need to be in the DAS. We took an inventory of which files are available on the data processing cluster and systematically recovered or replaced those that were missing. In doing this, we processed or reprocessed some or all of 52 different runs, which included much of the most difficult to reduce data from the observatory.

We calculated and applied improved uercal photometric calibration and incorporated them into the data distribution.

## 5.2. Data Distribution

Data distribution activities were focused on supporting existing public releases. We also worked to update and improve the organization of the SDSS web sites for the final data release. This work included both writing and editing of new pages.

### 5.2.1. Data Usage Statistics

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 and DR7.1 released on February 14, 2008.

Figure 5.1 plots the number of web hits we receive per month through the various SkyServer interfaces. In Q3 we recorded an average 10.1 million hits per month, compared to an average 8.6 million hits per month in Q2.

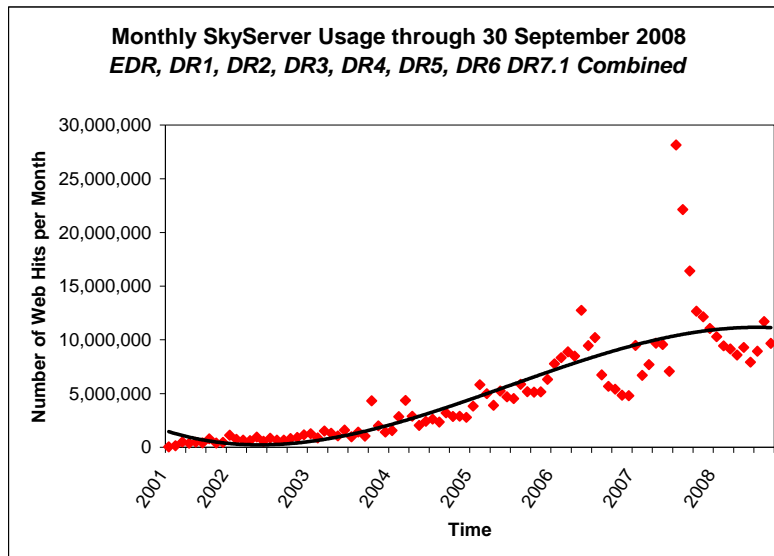


Figure 5.1 SkyServer usage per month, for all public releases combined.

Figure 5.2 shows the total number of SQL queries executed per month. We executed an average 0.6 million queries per month in Q3, compared to an average 1.3 million queries per month in Q2.

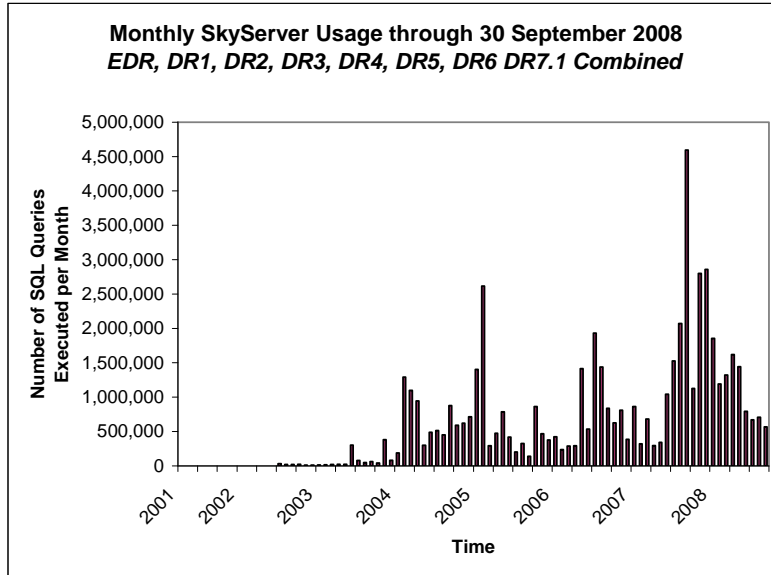


Figure 5.2 SkyServer usage, measured by the number of SQL queries submitted per month.

Through September 30, 2008, the SkyServer interfaces have received over of 449 million web hits and processed 53.8 million SQL queries. Over the past quarter, the SkyServer sites received a total of 30.38 million hits and processed 1.9 million SQL queries.

Figure 5.3 shows the volume of data transferred monthly from the DAS through the rsync server. A total of 1.2 TB of data were transferred via rsync in Q3 compared to 5.5 TB in Q2.

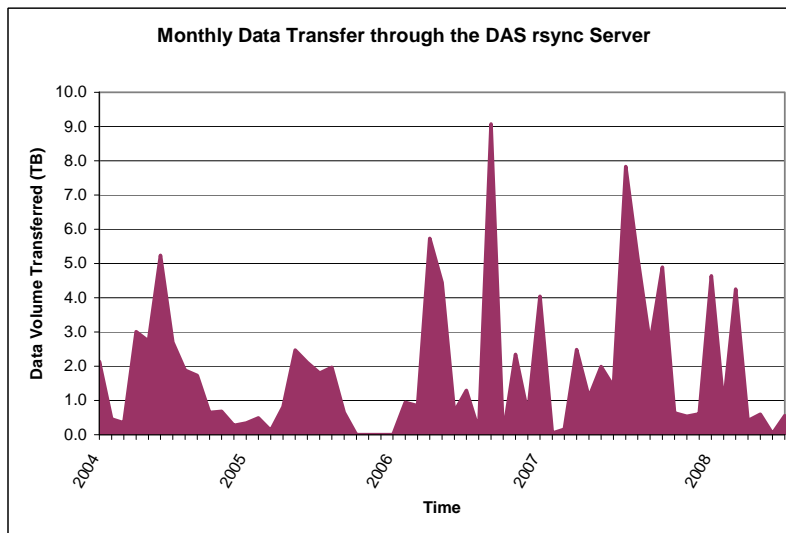


Figure 5.3 Monthly volumes of data transferred via the DAS rsync Server.

Figure 5.4 shows the volume of data transferred monthly through the DAS web interface. A total of 1.6 TB of data were transferred via the web interface in Q3, compared to 4.2 TB in Q2.

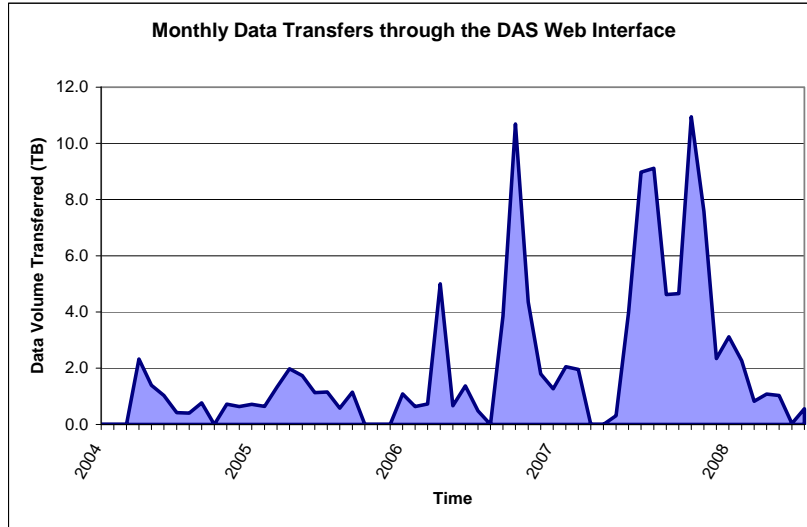


Figure 5.4 Monthly volume of data transferred via the DAS web interface.

### 5.2.2. Data Archive Server

We continued the reimplementaion of the DAS web interface, making the DAS interface independent of the SDSS data processing infrastructure and making a number of improvements. Testing and documentation of this new interface continued throughout this quarter.

We continued copying data from the data processing cluster into the network attached storage for distribution in the DAS. We completed the transfer of the data products corresponding to those that have been distributed by previous versions of the DAS. Transfer of additional data products required for the final data release, including the raw data frames, will be completed next quarter.

### 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 65 problem reports filed through the SDSS Problem-Reporting Database were fixed and closed, including eight filed as critical/high against DR7 and CAS.

We ran and loaded the latest SEGUE Stellar Parameter Pipeline (SSPP) results into DR7.2 CAS. We completed the processing and loading of SEGUE imaging and spectra into the DR7.2 CAS and DAS. The DR7 CAS finish step was completed in Q3 2008.

In Q4 we plan to fix or document any remaining CAS/SkyServer problem reports and load the public version of the DR7 CAS. We will also improve the CAS to DAS integration.

## 6. SURVEY PLANNING

### 6.1. Observing Aids

Responsibility for the plate inventory database was transferred to the observing staff at APO.

## 6.2. Target Selection

No plates were drilled this quarter.

## 6.3. Survey Planning

No survey planning was done this quarter.

## 7. EDUCATION AND PUBLIC OUTREACH

We made updates to the Solar System activity on the SkyServer. We also had a SkyServer booth at the JHU Physics Fair and the American Astronomical Society Symposium.

We dedicated efforts to working on the long range SDSS website to make it user friendly for teachers, students and the general public. This work included expanding the SDSS glossary, adapting a FAQ page from the CAS and reorganizing the value added catalogues.

The transition of EPO activities to SDSS-III began in Q3. We refocused our EPO plans to the emerging areas of citizen science. We are working with the University of Arizona to further develop these plans. In addition, we began working with the Galaxy Zoo education planning team to establish a relationship with SDSS-III.

## 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, 2008 consists of \$403K 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 \$4,018K for ARC-funded cash expenses.

Table 8.1 shows forecast cost performance for ARC-funded cash expenses in Q3. More complete tables comparing forecast 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 forecast in-kind contributions to the budget by quarter and annually.

Table 8.1 Q3 Cash Expenses and Forecast for 2008 (\$K)

Category	2008 – 3rd Quarter		2008 Operations Budget Total (for the period Jan-Dec 2008)	
	Baseline Budget	Actual Expenses	Baseline Budget	Forecast Expenses
1. Survey Management	155	156	488	435
2. Survey Operations				
2.1. Observing Systems	55	15	412	217
2.2. Observatory Operations	335	104	1,255	965
2.3. Data Processing	162	196	782	831
2.4. Data Distribution	89	117	411	500
2.5. ARC Support for Survey Ops	0	12	27	20
3. New Development				
3.1. SEGUE Development	0	0	0	0
3.2. Supernova Development	0	0	0	0
3.3. DA Upgrade	0	0	0	0
3.4. Photometric Calibration	0	0	0	0
4. ARC Corporate Support	0	13	31	51
Sub-total	796	613	3,406	2,964
5. Management Reserve	182	0	613	1,055
Total	978	613	4,018	4,018

## 8.1. Q3 Performance - In-kind Contributions

The sum of in-kind contributions in Q3 was \$142K against the baseline budget of \$70K. In-kind contributions were provided by Fermilab and JHU as follows:

- Fermilab provided support for survey management, data processing and data distribution activities. The level of in-kind effort required from Fermilab was more than budgeted.
- JHU provided support for the development, loading and hosting of databases associated with the CAS, CasJobs, and SkyServer. The level of in-kind effort required from JHU was more than budgeted.

## 8.2. Q3 Performance – ARC Funded Cash Expenses

ARC-funded expenses, before management reserve, of \$613K in Q3 were less than budget.

Survey Management costs were \$156K against a budget of \$155K. Expenses to support the project spokesperson and collaboration affairs were less than budgeted, driven by reduced travel by the spokesperson and the working group chairs. Expenses to support project management and the young astronomers fund were higher than planned driven by increased number of conference calls to plan the SDSS closeout activities. All other survey management costs were as anticipated. For the year, the revised forecast for Survey Management expenses is \$435K, or \$53K (11%) below the baseline budget of \$488K.

Observing Systems costs were \$15K against a budget of \$55K. Fermilab costs were lower than budgeted due to reduced closeout costs because of the startup of SDSSIII. For the year, the revised



forecast for Observing Systems expenses is \$217K, or \$195K (47%) below the baseline budget of \$412K.

Observatory Support costs were \$104K against a budget of \$335K. NMSU expenses were less than anticipated driven by reduced closeout costs because of the startup of SDSSIII. For the year, the revised forecast for Observatory Support expenses is \$965K, or \$290K (23%) below the baseline budget of \$1,255K.

Data Processing costs were \$196K against a budget of \$162K. Fermilab and Princeton expenses were greater than budgeted due to final accounting of expenses from 2007. For the year, the revised forecast for Data Processing costs is \$831K, or \$49K (6%) above the baseline budget of \$782K.

Data Distribution costs were \$117K against a budget of \$89K. FNAL expenses were greater than budgeted due to delayed billing for hardware purchased earlier in the year. For the year, the revised forecast for Data Distribution costs is \$500K, \$89K (22%) above the baseline budget of \$411K driven by accounting issues that resulted in the carryover into 2008 of some of JHU 2007 Q4 expenses.

ARC Support for Survey Operations costs and Miscellaneous ARC corporate expenses (i.e., audit fees, bank fees, petty cash, and APO trailer rentals) were \$12K against a zero budget driven by timing of expenses. For the year, the revised forecast for ARC Support of Survey Operations is \$20K, \$7K (23%) below the baseline budget.

### 8.3. Q3 Performance - Management Reserve

No management reserve funds were expended in Q3.

## 9. PUBLICATIONS

In Q3, there were 14 papers based on not-yet-public SDSS data that were published by members of the SDSS collaboration and not previously reported. There were also 111 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.

**Exhibit 1 CY2008 Cash Expenses (\$000s)**

**SDSS-II CY2008 Cost Performance as of September 30, 2008**

**OPERATIONS BUDGET - CASH EXPENSES**

Inst	Qtr 1 Jan-Mar		Qtr 2 Apr - Jun		Qtr 3 Jul-Sep		Qtr 4 Oct-Dec		CY2008 Total		Variance % H/(L)
	Actual Expenses	Approved Baseline Budget	Actual Expenses	Approved Baseline Budget	Actual Expenses	Approved Baseline Budget	Actual Expenses	Approved Baseline Budget	Oct-2008 Forecast	Oct-2008 Forecast	
<b>1.0 Survey Management</b>											
SSP-221	ARC	0	0	0	0	0	0	0	0	0	---
SSP-224	ARC	25	22	21	21	21	21	21	21	79	157%
SSP-246	PU	.3	.1	.1	.1	.1	.1	.1	.1	72	(85%)
SSP-248	FNAL	20	20	27	27	27	27	27	27	92	300%
SSP-267	UC	13	12	34	36	34	36	34	36	63	(3%)
SSP-270	UW	18	8	7	6	7	6	7	6	47	(16%)
SSP-291A	ARC	6	16	.1	0	.1	0	0	0	15	---
SSP-291B	ARC	1	0	0	4	0	4	0	0	9	(68%)
SSP-291C	ARC	10	6	0	3	0	3	0	10	87	100%
SSP-291f	ARC	2	0	0	0	0	0	0	0	16	(100%)
SSP-291K	ARC	0	2	0	0	0	0	0	0	10	---
<b>Survey Management Sub-total</b>		<b>95</b>	<b>91</b>	<b>156</b>	<b>155</b>	<b>156</b>	<b>155</b>	<b>156</b>	<b>92</b>	<b>488</b>	<b>2%</b>
<b>2.0 Survey Operations</b>											
<b>2.1 Observing Systems</b>											
SSP-231	UW	25	19	0	0	3	0	0	15	119	---
SSP-232	PU	12	12	0	0	0	0	0	0	23	---
SSP-242	FNAL	69	48	11	55	11	55	2	0	233	(80%)
SSP-261	FNAL	2	0	1	0	1	0	0	0	6	(100%)
SSP-291D	ARC	0	0	0	0	0	0	0	0	30	---
<b>Observing Systems Sub-total</b>		<b>108</b>	<b>79</b>	<b>15</b>	<b>55</b>	<b>15</b>	<b>55</b>	<b>2</b>	<b>15</b>	<b>412</b>	<b>667%</b>
<b>2.2 Observatory Support</b>											
SSP-235	NMSU	387	422	312	312	95	312	0	4	1,188	(70%)
SSP-302	UW	6	18	15	15	6	15	0	0	35	(61%)
SSP-272	JHU	12	12	8	8	4	8	0	0	32	(50%)
<b>Observatory Support Sub-total</b>		<b>405</b>	<b>452</b>	<b>335</b>	<b>335</b>	<b>104</b>	<b>335</b>	<b>0</b>	<b>4</b>	<b>1,255</b>	<b>(69%)</b>
<b>2.3 Data Processing</b>											
SSP-240	FNAL	112	203	104	97	104	97	3	44	459	6%
SSP-238	PU	94	101	60	60	92	60	7	30	267	54%
SSP-239	UC	20	20	5	5	0	5	0	14	56	(100%)
<b>Data Processing Sub-total</b>		<b>225</b>	<b>323</b>	<b>162</b>	<b>162</b>	<b>196</b>	<b>162</b>	<b>10</b>	<b>88</b>	<b>782</b>	<b>21%</b>
<b>2.4 Data Distribution</b>											
SSP-268	FNAL	103	104	67	67	85	67	22	52	316	27%
SSP-237	JHU	17	92	32	22	32	22	5	17	95	46%
<b>Data Distribution Sub-total</b>		<b>119</b>	<b>196</b>	<b>89</b>	<b>89</b>	<b>117</b>	<b>89</b>	<b>27</b>	<b>69</b>	<b>411</b>	<b>31%</b>
<b>2.5 ARC Support for Survey Operations</b>											
SSP911	ARC	5	0	0	0	5	0	0	0	20	---
SSP911h	ARC	3	0	0	0	7	0	0	0	7	---
<b>Data Distribution Sub-total</b>		<b>9</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>27</b>	<b>---</b>
<b>Survey Operations Sub-total</b>		<b>866</b>	<b>1,049</b>	<b>641</b>	<b>641</b>	<b>443</b>	<b>641</b>	<b>39</b>	<b>176</b>	<b>2,886</b>	<b>(31%)</b>
<b>Survey Management Sub-total</b>		<b>95</b>	<b>91</b>	<b>156</b>	<b>155</b>	<b>156</b>	<b>155</b>	<b>156</b>	<b>92</b>	<b>488</b>	<b>(11%)</b>
<b>Survey Operations Sub-total</b>		<b>866</b>	<b>1,049</b>	<b>641</b>	<b>641</b>	<b>443</b>	<b>641</b>	<b>39</b>	<b>176</b>	<b>2,886</b>	<b>(14%)</b>

**Exhibit 1 CY2008 Cash Expenses (continued)**

**SDSS-II CY2008 Cost Performance as of September 30, 2008**

Inst	Qtr 1 Jan-Mar		Qtr 2 Apr-Jun		Qtr 3 Jul-Sep		Qtr 4 Oct-Dec		CY2008 Total			
	Actual Expenses	Approved Baseline Budget	Actual Expenses	Approved Baseline Budget	Actual Expenses	Approved Baseline Budget	Actual Expenses	Approved Baseline Budget	Oct-2008 Forecast	Oct-2008 Forecast	Variance % H(L)	Variance % H(L)
<b>3.0 New Development</b>												
3.1 SEGUE Survey Development												
SSP-138	0	0	0	0	0	0	0	0	0	0	---	---
SSP271	0	0	0	0	0	0	0	0	0	0	---	---
SSP273	0	0	0	0	0	0	0	0	0	0	---	---
SSP-268	0	0	0	0	0	0	0	0	0	0	---	---
SEGUE Development Sub-total												
3.2 Supernova Survey Development	0	0	0	0	0	0	0	0	0	0	---	---
No allocation												
Supernova Development Sub-total												
3.3 Data Acquisition System Upgrade	0	0	0	0	0	0	0	0	0	0	---	---
No allocation												
DA Upgrade Sub-total												
3.4. Photometric Calibration Development	0	0	0	0	0	0	0	0	0	0	---	---
SSP-138	0	0	0	0	0	0	0	0	0	0	---	---
Photometric Calibration Sub-total												
<b>New Development Sub-total</b>												
<b>0</b>												
<b>4.0 ARC Corporate Support</b>												
SSP291e	5	6	6	.5	13	13	2641%	12	27	116%	116%	64%
SSP291g	0	0	0	0	0	0	---	0	0	---	---	---
ARC Corporate Support Sub-total												
<b>5</b>												
<b>5.0 Management Reserve</b>												
<b>967</b>												
<b>Cash Budget Sub-total</b>												
<b>967</b>												
<b>5.0 Management Reserve</b>												
<b>0</b>												
<b>TOTAL CASH BUDGET</b>												
<b>967</b>												
<b>978</b>												
<b>165</b>												
<b>1,349</b>												
<b>4,018</b>												
<b>4,018</b>												
<b>2,964</b>												
<b>613</b>												
<b>1,055</b>												
<b>72%</b>												
<b>252%</b>												
<b>1201%</b>												
<b>719%</b>												
<b>(13%)</b>												

**Exhibit 2 CY2008 In-Kind Contributions (\$000s)**

**SDSS-II CY2008 Cost Performance as of September 30, 2008**

Inst	Qtr 1 Jan-Mar		Qtr 2 Apr-Jun		Qtr 3 Jul-Sep		Qtr 4 Oct-Dec		CY2008 Total		
	Actual	Approved	Actual	Approved	Actual	Approved	Actual	Approved	Oct-2008	Variance %	
	Expenses	Baseline	Expenses	Baseline	Expenses	Baseline	Forecast	Budget	Forecast	H/(L)	
<b>OPERATIONS BUDGET: IN-KIND</b>											
<b>1.0 Survey Management</b>											
SSP-248	FNAL	24	19	22	20	20	8	8	75	71	(5%)
<b>Survey Management Sub-total</b>											
		24	19	22	20	20	8	8	75	71	(5%)
<b>2.0 Survey Operations</b>											
2.1 Observing Systems											
SSP-231	UW	0	0	0	0	0	0	0	30	0	(100%)
<b>Observing Systems Sub-total</b>											
		0	0	0	0	0	0	0	30	0	(100%)
2.2 Data Processing											
SSP-239	UC	0	7	0	0	0	0	0	10	7	(33%)
SSP-240	FNAL	75	48	32	76	140%	11	16	211	215	1%
SSP-269	MSU	0	0	0	0	---	0	0	0	0	---
<b>Data Processing Sub-total</b>											
		75	55	32	76	140%	11	16	222	221	(0%)
2.3 Data Distribution											
SSP-237	JHU	(9)	6	0	22	---	0	3	22	22	---
SSP-268	FNAL	17	20	16	24	49%	5	10	54	71	32%
<b>Data Distribution Sub-total</b>											
		8	26	16	46	183%	5	13	76	94	23%
<b>Survey Operations Sub-total</b>											
		83	81	48	122	155%	16	29	328	315	(4%)
<b>3.0 New Development</b>											
3.1 SEQUE Survey Development											
SSP-237	JHU	0	0	0	0	---	0	0	0	0	---
SSP-269	MSU	0	0	0	0	---	0	0	0	0	---
<b>SEQUE Development Sub-total</b>											
		0	0	0	0	---	0	0	0	0	---
<b>New Development Sub-total</b>											
		0	0	0	0	---	0	0	0	0	---
<b>TOTAL IN-KIND CONTRIBUTIONS</b>											
		107	100	70	142	103%	24	37	403	386	(4%)
<b>TOTAL OPERATING BUDGET (Cash and In-kind)</b>											
		1,073	1,247	1,048	755	(28%)	188	1,386	4,421	4,404	(0%)

### Exhibit 3 Papers from within the SDSS Collaboration

1. A Measurement of the Rate of Type Ia Supernovae at Redshift  $z \sim 0.1$  from the First Season of the SDSS-II Supernova Survey. *ApJ* 2008, 682, pp. 262-282 – Benjamin Dilday
2. Five New High-Redshift Quasar Lenses from the Sloan Digital Sky Survey. *AJ* 2008, submitted – Naohisa Inada
3. Old-Population Hypervelocity Stars From the Galactic Center: Limits from the SDSS. *ApJ*, 2008, submitted – Juna A. Kollmeier
4. Measuring the undetectable: Proper motions and parallaxes of very faint sources. 2008, submitted – Hogg
5. Lessons learned from Sloan Digital Sky Survey operations. *SPIE Proc.* 2008, 7016 pp. 70160B-70160B-12 – S. J. Kleinman
6. Mass models and environment of the new quadruply lensed quasar SDSS J1330+1810. *MNRAS* 2008, submitted – Masamune Oguri
7. Properties of Discs and Bulges of Spiral and Lenticular Galaxies in the Sloan Digital Sky Survey. 2008, submitted – Nobuyuki Oohama
8. Efficient Photometric Selection of Quasars from the Sloan Digital Sky Survey: II.  $\sim 1,000,000$  Quasars from Data Release Six. *ApJ Supplement* 2008, submitted – Gordon Richards
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11. Quasar Clustering from SDSS DR5: Dependences on Physical Properties – Yue Shen
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#### Exhibit 4 Publications Based on Public Data

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