

Annual Report for Period:03/2008 - 02/2009

Submitted on: 07/26/2009

Principal Investigator: Walter, Donald .

Award ID: 0750814

Organization: South Carolina St Univ

Submitted By:

Walter, Donald - Principal Investigator

Title:

A Partnership in Observational and Computational Astronomy

Project Participants

Senior Personnel

Name: Walter, Donald

Worked for more than 160 Hours: Yes

Contribution to Project:

As PI, Walter has been responsible for the day-to-day operation of the project including oversight of the work by Co-PIs and others involved in the project.

He worked with the SCSU Office of Sponsored Programs and the Grants and Contracts office to ensure that the financial account was setup and properly maintained. He was responsible for ensuring that the Clemson subaward was issued. He completed all SCSU internal reporting and accounting requirements. He, with the help of the part-time administrative assistance, executed all procurement and related financial transactions.

Walter was the main point of contact and responsible for communication among the partner institutions, Co-PIs, collaborators and students.

Walter conducted faculty research on RV Tauri stars. He visited Kitt Peak National Observatory twice to conduct repair work on the 1.3 meter telescope.

Walter made presentations on the PAARE project at several national and regional meetings including the American Astronomical Society (AAS) and the National Society of Black Physicists. Additional dissemination duties included issuing press releases, giving talks in the local community and writing an article for the 'Spectrum', a newsletter published by Committee on the Status of Minorities in Astronomy within the AAS.

Walter served as mentor to an undergraduate student whose work was presented at the annual conference of the National Society of Black Physicists.

Name: Howell, Steven

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Howell is the Co-PI on this project from the National Optical Astronomy Observatory (NOAO). He has served as the mentor to the SCSU faculty and students for research and a point of contact for access to KPNO facilities. Howell has worked with PI Walter and Co-PI Cash to develop short and long term plans to conduct collaborative research with him on RV Tauri stars. He has prepared for a SCSU intern to come to KPNO for the summer of 2009. That student's research project is being coordinated by Howell to complement the work by interns who will stay behind at SCSU. Howell has advised Walter and Cash on preparation for future observing proposals on the use of the KPNO Coude Feed telescope and the NASA Kepler Mission.

Name: Leising, Mark

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Leising is the Co-PI on this project from Clemson University (CU). He handles financial and administrative matters related to the subaward. He coordinates faculty and student participation at and with CU, including SCSU access to CU observing facilities at KPNO and elsewhere.

Leising has traveled to SCSU to meet faculty and students and talk about his research.

He coordinated an overnight visit by three SCSU students and two professors in July 2008 to discuss their summer's work, hear

about research opportunities from graduate students and faculty, get to know Clemson, and hear more directly from students what graduate school is like. Research activities of everyone involved at both institutions was presented.

Leising has prepared a research project for an SCSU who will be in residence at CU during the summer of 2009. Additionally, he served as the point of contact between Co-PI Cash at SCSU and researchers at CU who included Cash and SCSU in their preproposal to NSF Partnerships for International Research and Education (PIRE).

Name: Smith, Daniel

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Smith has concentrated largely on two areas related to the project, recruitment and development of curriculum materials. He has personally contacted prospective freshmen to recruit them into the SCSU physics program in general and the astronomy option in particular. He has developed recruitment materials for dissemination at conferences and to schools.

Smith has developed two new laboratory exercises and tested them on classes and summer students. These include an astronomy lab for a sophomore level physics course and an astronomy lab for a non-majors physical science course.

Smith has also spent time lecturing to the summer PAARE students. His background in extragalactic astronomy and cosmology is a important addition to the project.

Name: Cash, Jennifer

Worked for more than 160 Hours: Yes

Contribution to Project:

Jennifer Cash has conducted faculty-level research on RV Tauri stars. She has supported dissemination of the project results by giving a talk at the University of Wyoming. She was coauthor on a poster describing the project given at the national meeting of the American Astronomical Society (AAS).

Cash has served as the lead faculty mentor at SCSU. This includes organizing student skill-building sessions and talks by visiting astronomers. She has been the mentor for two students during the first year. Their work was presented as a student poster at the January 2009 AAS meeting.

Name: Mayo, Elizabeth

Worked for more than 160 Hours: Yes

Contribution to Project:

Dr. Mayo is the Planetarium Manager, an Assistant Professor of Physics and a Radio Astronomer at SCSU. She has contributed to this project in a number of ways during the first year.

Mayo completed her Ph.D. in radio astronomy at the beginning of Year 1 of the project. She, along with her faculty adviser at the University of Kentucky, is preparing two papers for submission. At the January 2009 meeting of the AAS she was the sole speaker at a talk and the lead on a poster as well as coauthor on another poster.

Mayo has conducted outreach activities such as planetarium shows and talks during which she discusses the PAARE project and recruits prospective K-12 students to attend SCSU and major in physics.

Mayo has demonstrated use of radio telescopes and lectured to the SCSU PAARE undergraduates participating in summer research. Additionally, she has worked with the PI on restoring the roof-top radio telescope to use for research and display purposes.

Name: King, Jeremy

Worked for more than 160 Hours: No

Contribution to Project:

Dr. King was responsible for coordinating a research visit by an SCSU undergraduate to Kitt Peak National Observatory (KPNO) to observe on the 4-meter telescope with a senior graduate student from Clemson. This trip to KPNO was instrumental in inspiring the SCSU physics major to select the astronomy option as their major. This undergraduate has subsequently been selected to conduct research at Clemson University in the summer of 2009.

Dr. King also submitted a NSF Astronomy and Research Grant (AAG) that would involve Walter and the use of SCSU's observing

time on the 1.3 meter telescope at KPNO.

Name: Mighell, Kenneth

Worked for more than 160 Hours: No

Contribution to Project:

Dr. Mighell has collaborated on this PAARE project in his role as the NSF REU Site Director at KPNO. He has coordinated the preparations for the summer 2009 internship at KPNO by an SCSU student. He met with that student and motivated him accept the position. Mighell has designed the SCSU PAARE internship to include full participation in the KPNO REU program. He has advised the SCSU PI on a computer purchase for the SCSU student so his machine be fully compatible with the other REU student machines.

Name: Hartmann, Dieter

Worked for more than 160 Hours: No

Contribution to Project:

Dr. Hartmann is preparing for SCSU's participation in future optical follow-ups to Gamma Ray Bursts. This will include using a portion of SCSU's guaranteed observing time on the KPNO 1.3-meter telescope known as the Robotically Controlled Telescope (RCT). Participation by SCSU awaits final repair work on the RCT.

Post-doc

Graduate Student

Undergraduate Student

Name: Banks, Ne'Cuana

Worked for more than 160 Hours: Yes

Contribution to Project:

Ne'Cuana Banks was a physics major who selected the astronomy option and received a scholarship from PAARE in the Fall 2008 semester. She participated in a number of student skill building sessions, attended talks by visiting speakers and other activities such as observing sessions. Unfortunately, she dropped out after the end of the fall term because of family issues.

Name: Davis, Graham

Worked for more than 160 Hours: Yes

Contribution to Project:

Graham Davis is a physics major who selected the astronomy option. He held a PAARE scholarship in the 2008-09 year. He was a PAARE research intern in the summer of 2008 and presented his results in a student poster at the January 2009 meeting of the American Astronomical Society. He also participated in a number of student skill building sessions, attended talks by visiting speakers and other activities such as observing sessions.

Name: Davis, Joshua

Worked for more than 160 Hours: Yes

Contribution to Project:

Joshua Davis was a physics major who selected the astronomy option. He held a PAARE scholarship in the fall of 2008. He was a PAARE research intern in the summer of 2008. Unfortunately he dropped out of school during the fall 2008 term because of family issues.

Name: Durant, Patrick

Worked for more than 160 Hours: Yes

Contribution to Project:

Patrick Durant is a physics major who has not yet selected the astronomy option. He was a PAARE research intern in the summer of 2008 and presented his results as a student poster at the February 2009 national meeting of the Society of Black Physicists. He has accepted a summer 2009 PAARE internship to work with Co-PI Dr. Steven Howell at NOAO.

Name: Lalmansingh, Jared

Worked for more than 160 Hours: No

Contribution to Project:

Jared Lalmansigh is a physics major who selected the astronomy option in the spring of 2009. He visited Kitt Peak in November 2008 and observed on the 4-meter telescope with Clemson graduate student Eric Bubar. He is an SCSU Presidential Scholar, which is a full scholarship; therefore, he cannot accept a PAARE scholarship during the academic year. He has accepted a summer 2009 PAARE internship to work with Co-PI Dr. Mark Leising at Clemson University.

Technician, Programmer

Other Participant

Research Experience for Undergraduates

Organizational Partners

Clemson University

Collaborators from Clemson University have provided lead school SCSU with access to their facilities at KPNO. Specifically, an observing run on the 4 meter telescope in November of 2008 included PI Walter and an undergraduate student Jared Lalmansigh working with Clemson graduate student Eric Bubar. The session was a seminal event for the SCSU student, inspiring him to change his degree option from general physics to physics with the astronomy option.

Clemson astronomers, specifically Co-PI Mark Leising, have prepared for collaborative research with an SCSU undergraduate intern during the summer of 2009.

Clemson faculty member and Co-PI Mark Leising visited SCSU in September to meet more faculty and students, and to give the students details on problems and opportunities in high-energy space astronomy.

Three SCSU students and two professors visited Clemson in July 2008 to discuss their summer's work, hear about research opportunities from graduate students and faculty, get to know Clemson, and hear more directly from students what graduate school is like. Research activities of everyone involved at both institutions was presented.

Western Kentucky University

Astronomers at Western Kentucky University (WKU) have worked with SCSU astronomers to prepare the 1.3 meter telescope, also known as the Robotically Controlled Telescope (RCT), for research use under the PAARE award. SCSU and WKU have collaborated with other schools over the years in the management of the telescope. Lightning strikes in the summer of 2008 have resulted in multiple equipment failures. SCSU and WKU worked on those problems and the telescope is being prepared to be brought online. The RCT will be used by SCSU in its long term study of RV Tauri stars.

National Optical Astronomy Observatory

NOAO personnel Co-PI Howell and Senior Personnel Mighell have collaborated on this project in a number of ways. They have helped coordinate and plan both student research and faculty research.

Up to 20% of Howell's time is being allocated to the SCSU PAARE project. Howell has provided archival spectra from the coude feed telescope that contribute significantly to the RV Tauri research at SCSU. He has helped SCSU faculty members organize their research project through near-term and long-term planning.

Mighell is the NSF REU Site Coordinator at KPNO and has helped SCSU prepare to send a summer intern to KPNO to work with Howell in the summer of 2009. Mighell himself spoke to the student and helped motivate him to participate.

Other Collaborators or Contacts

Activities and Findings

Research and Education Activities: (See PDF version submitted by PI at the end of the report)

A variety of activities were supported in Year 1 under the SCSU PAARE award that are not described in detail elsewhere in this report.

- February 2009, South Carolina State University, Orangeburg, SC

SCSU Co-PI Dr. Jennifer Cash at SCSU is collaborating with Clemson University on an NSF Partnerships for International Research and Education (PIRE) pre-proposal entitled 'PIRE: Accelerating Image-Processing Algorithms with RPU and GPU Architectures for Large-Scale, Real-Time Astronomical Calculations.' This project aims to meet the critical performance and energy requirements of the Australian Square Kilometer Array Pathfinder (ASKAP) while providing an opportunity for students to study and conduct research at unique facilities. While the technical aspects of the project will be conducted at Clemson with collaborators at Cray and DRC computing, the collaboration will also include a targeted educational outreach including South Carolina State University.

- February 11-15, 2009, National Society of Black Physicists Conference, Nashville, TN

An exhibit booth was displayed describing the SCSU-Clemson-NOAO PAARE project in order to recruit students to the summer astronomy internship program at SCSU and the astronomy Ph.D. program at Clemson University.

- February 11-15, 2009, National Society of Black Physicists Conference, Nashville, TN

Patrick Durant, SCSU Physics Major and PAARE Summer Research Intern presented a poster entitled: 'Analysis of Emission Lines in Select RV Tauri Stars'. See Figure 5 in attached Activities PDF file.

- November 14-15, 2009, Kitt Peak National Observatory, Kitt Peak, AZ

PI Dr. Donald Walter and SCSU physics major Jared Lalmansingh participated in an observing run on the 4-meter telescope with Clemson graduate student Eric Bubar. The experience so inspired student Lalmansingh that he decided to switch from a general physics major to physics major with the astronomy option. See Figures 3 and 4 in the attached Activities PDF file.

- November 13-14, 2009, South Carolina State University, Orangeburg, SC

Guest speakers from Lawrence Livermore National Lab visited SCSU and spoke to students and faculty. The visitors included astronomer Dr. David Dearborn and physicist Dr. Kennedy Reed. Dearborn spoke about his research and LLNL opportunities while Kennedy spoke about 'Physics in Africa', based on his travels and talks throughout the continent.

- October 20-23, 2009, NOAO & KPNO, Tucson, AZ

PI Dr. Donald Walter visited NOAO and KPNO offices in Tucson and on the mountain. He met with NOAO Director Dr. David Silva and Co-PI Dr. Steven Howell and Collaborator Dr. Kenneth Mighell. They discussed the SCSU-NOAO partnership under the PAARE proposal. Walter also met with KPNO Director Buell Jannuzi and a number of his technical, financial and support staff members to discuss future involvement by SCSU under the PAARE award and through SCSU's participation in managing the 1.3-meter telescope via its membership in the Robotically Controlled Telescope Consortium. Additionally, Walter carried out some trouble shooting of the 1.3-meter and size-tested some new narrow band filters to be used with the telescope.

- September 25, 2009, South Carolina State University, Orangeburg, SC

Clemson Co-PI Dr. Mark Leising, traveled to SCSU to meet PAARE faculty and students, and to give the students details on opportunities in high-energy space astronomy.

- September 14-16 2009, University of Wyoming, Laramie, WY

SCSU Co-PI Dr. Jennifer Cash gave a talk at the Rebka Science Conference entitled 'Partnership in Observational and Computational Astronomy at South Carolina State University'.

- September ? November 2008, South Carolina State University, Orangeburg, SC

Physics majors in the astronomy option and other interested students participated in a series of nearly weekly activities that related to the PAARE award. Activities ranged from attending two 'Meet an Astronomer' talks, reading and discussing journal articles to assisting with a public observing session. Skill building sessions were also part of this activity and included learning how to write a paper abstract, how to write a resume and how to read a professional journal article. Anywhere from 3 to 6 students attended each session.

- July 14-15, 2008, Clemson University, Clemson, SC

Three SCSU PAARE students and two professors visited Clemson to discuss their summer's work, hear about research opportunities from

graduate students and faculty, get to know Clemson, and hear more directly from students what graduate school is like. Research activities of everyone involved at both institutions was presented.

- May 21, 2008 ? July 25, 2008, South Carolina State University, Orangeburg, SC

The PAARE Summer Internship Program was held at SCSU. This REU-type program included research and learning opportunities for three SCSU physics majors, Graham Davis, Joshua Davis and Patrick Durant. The students were given a series of talks, readings and exercises to familiarize them with the field of astronomy. They spent most of the summer working on research projects related to the light curves of RV Tauri stars (Davis and Davis) and the spectroscopy of RV Tauri stars (Durant). Both projects lead to presentations at national conferences described elsewhere in this report. Additional activities included hands-on observing with 8-inch portable telescopes, planetarium programs and use of a CCD camera. A videoconference with NOAO Co-PI Dr. Steve Howell was held to give the students a chance to 'Meet an Astronomer'. Weekly journal readings and a discussion were part of the program as was a weekly off-campus lunch with the faculty members and other social activities. See Figures 1, 2 and 5 in the attached Activities PDF file.

- April 21-22, 2008, National Science Foundation, Arlington, VA

PI Dr. Donald Walter served as a member of the Galactic Astronomy panel reviewing proposals on the theme of 'Interstellar Medium' under FY 2008 Astronomy & Astrophysics Research Grants (AAG) program in the Division of Astronomical Sciences (AST) at the National Science Foundation.

Findings:

Training and Development:

Training in Year 1 of the PAARE award to SCSU included:

- September 10-12, 2008, ITT Visual Information Solutions, Boulder, CO

PI Dr. Donald Walter attended a three-day IDL training workshop. He learned image processing techniques that will supplement his experience using IRAF for astronomical image processing. Additionally, this experience will be applied to the classroom in the course Walter teaches, Physics 338, 'Scientific Image Analysis'. This course is required of all physics majors who chose the astronomy medical physics and health physics options. Physics 338 was first taught in the academic year 2008-09, after Walter attended this workshop.

- September ? November 2008, South Carolina State University, Orangeburg, SC

PAARE scholarship recipients and other interested students participated in a series of nearly weekly activities that related to training. Activities ranged from attending two 'Meet an Astronomer' talks, reading and discussing journal articles to assisting with a public observing session. Skill building sessions were also part of this activity and included learning how to write a paper abstract, how to write a resume and how to read a professional journal article. Anywhere from 3 to 6 students attended each session.

- May 21, 2008 ? July 25, 2008, South Carolina State University, Orangeburg, SC

The SCSU REU-like astronomy program funded under PAARE as described in the 'Activities' section of this report included training for three SCSU physics majors. The students were trained in the use of the Linux operating system, IDL and IRAF software packages as well as how to write and orally present their research.

Outreach Activities:

A variety of outreach activities were supported in Year 1 including talks, workshops, planetarium shows and observing sessions. In addition to the specific activities listed below, faculty members participated in numerous other activities such as planetarium shows and judging science fairs that promoted the project and advanced the public's understanding of astronomy.

- February 24, 2009, Hartsville High School, Hartsville, South Carolina

Several talks were given to a total of 107 high school students on the topics of astronomy and STEM opportunities at SCSU.

- February 20, 2009, South Carolina State University, Orangeburg, South Carolina

An observing session was held for approximately 30 people in conjunction with a new, non-science exhibit opening at the campus museum and planetarium.

- November 23, 2008, South Carolina State University, Orangeburg, South Carolina

A workshop was held on astronomy and science for 22 cub scouts, thus allowing the scouts to earn their Webelos Science Badge.

- November 10, 2008, South Carolina State University, Orangeburg, South Carolina

A public, evening observing session was held on campus and approximately 75 people attended.

- May 16, 2008, South Carolina State University, Orangeburg, South Carolina

A talk on the topic of comets was given to 17 visiting K-12 teachers.

- March 30, 2008, South Carolina State University, Orangeburg, South Carolina

A planetarium show and museum exhibit was held for 37 cub scouts and their parents on the topics of astronomy and the Hubble Space Telescope.

- March 1, 2008, South Carolina State University, Orangeburg, South Carolina

A talk was given to approximately 60 members of the general public on research conducted with the Hubble Space Telescope by SCSU faculty. It was at this talk that the first announcement was made of the NSF PAARE award to SCSU

- March 1, 2008 - June 9, 2008, South Carolina State University, Orangeburg, South Carolina

The I.P. Stanback Museum and Planetarium on the campus of SCSU displayed a traveling exhibit on the Hubble Space Telescope and astronomy. Approximately 3,000 people visited the exhibit.

Journal Publications

E. Mayo & T. Troland, "VLA HI Zeeman Observations of the Cygnus X Regions DR 22 and ON 2", The Astronomical Journal, p. , vol. , (2009). In preparation,

E. Mayo, N. Abel, P. Lockett, A. Sarma & T. Troland, "VLA OH Zeeman Observations and Complete Environmental Analysis of NGC 6334 A", The Astrophysical Journal, p. , vol. , (2009). In preparation,

Books or Other One-time Publications

Walter, Donald K.; Brittain, S. D.; Cash, J. L.; Hartmann, D. H.; Howell, S. B.; King, J. R.; Leising, M. D.; Mayo, E. A.; Mighell, K. J.; and Smith, D. M., Jr, "A Partnership in Observational and Computational Astronomy (POCA)", (2009). , Published
 Editor(s): American Astronomical Society, AAS Meeting #213, #431.02
 Collection: Bulletin of the American Astronomical Society, Vol. 41, p.263
 Bibliography: 2009AAS...21343102W

Mayo, Elizabeth A, "Magnetic Fields in the Galaxy", (2009). , Published
 Editor(s): American Astronomical Society, AAS Meeting #213, #324.02
 Collection: Bulletin of the American Astronomical Society, Vol. 41, p.380
 Bibliography: 2009AAS...21332402M

Mayo, Elizabeth A and Zisholtz, E.N, "The I.P. Stanback Museum and Planetarium: Where Civil Rights and Arts Encounter Science and Humanities", (2009). , Published

Editor(s): American Astronomical Society, AAS Meeting #213, #464.03
 Collection: Bulletin of the American Astronomical Society, Vol. 41, p.409
 Bibliography: 2009AAS...21346403M

Davis, Joshua and Davis, G, "Methods of Period Determination in RV Tauri Stars", (2009). , Published
 Editor(s): American Astronomical Society, AAS Meeting #213, #434.09
 Collection: Bulletin of the American Astronomical Society, Vol. 41, p.304
 Bibliography: 2009AAS...21343409D

Walter, Donald, "A Partnership in Observational and Computational Astronomy", (2009). , Published
 Editor(s): Spectrum Newsletter of the AAS Committee on the Status of Minorities in Astronomy
 Bibliography: <http://csma.aas.org/spectrum.html>

Web/Internet Site

URL(s):

<http://physics.scsu.edu/paare/>

Description:

This site is in preparation and will be active after 9/30/09

This site will be the main source of dissemination for the SCSU PAARE Project "A Partnership in Observational and Computational Astronomy". It will include general information about the award, students, faculty, products and resources

Other Specific Products

Product Type:

Teaching aids

Product Description:

"Galaxies and the Size of the Universe" is a new laboratory exercise that has been developed and tested in the classroom for non-science majors including education majors enrolled in a general education laboratory on earth and space science. This new lab studies galaxy types and structure and compares distances in space, including the Sun-Earth distance, distances to nearby stars and distances to nearby galaxies.

Sharing Information:

Currently it is in use at SCSU each semester in the course, Physical Science 153, Earth and Space Science Laboratory. It will be demonstrated to colleagues at other institutions, presented at the national meeting of the American Association of Physics Teachers and posted for distribution on our SCSU PAARE website.

Product Type:

Teaching aids

Product Description:

"Large Scale Structure of the Universe" is a new laboratory exercise that has been developed and tested in the classroom for use in the third semester, sophomore-level physics lab course. This course includes physics and engineering majors.

This lab studies the large scale structure of the Universe. It requires to the student to download a large set of data from the Sloan Digital Sky Survey and plot the data in 3-D. Students view and discuss structures based on galaxy distribution. Additionally, students calculate the correlation function for probability of clustering of galaxies and compare its distribution to clustering of night-time city lights on Earth as viewed from space.

Sharing Information:

Currently it is in use at SCSU each fall term in the course, Physics 223, General Physics Lab III. It will be demonstrated to colleagues at other institutions, presented at the national meeting of the American Association of Physics Teachers, posted for distribution on our SCSU PAARE website and incorporated into an interactive museum exhibit in Year 3 of the project.

Contributions

Contributions within Discipline:

Year 1 of the project has largely been devoted to getting the research, education and outreach components of program organized and operational. In Year 2 and beyond we anticipate making contributions to the field. These will include a better understanding of the role magnetic fields play in star formation (Mayo) as well as advancing our understanding of RV Tauri stars (Cash, Howell, Walter). Contributions from research at Clemson (Leising) including SCSU student participation is also anticipated in the near future. Contributions in education are also anticipated in the future (Smith) as we implement and disseminate the educational materials developed in Year 1.

Contributions to Other Disciplines:

Contributions to Human Resource Development:

Year 1 of the SCSU PAARE project has provided opportunities for research, teaching and mentoring in astronomy at SCSU, a Historically Black College/University located in rural South Carolina with an enrollment of approximately 4,500 students. Over 90% of the student population is African-American.

While the faculty and curriculum were largely in place at SCSU prior to the award, the PAARE project allowed the faculty and students to participate in astronomical activities on a scale not previously possible. Partners, Clemson University and NOAO, have strongly embraced the concept of partnering, providing SCSU with access to people and resources previously unavailable. In turn, SCSU has been given the opportunity to contribute to the research and education activities of the partners.

A total of 5 SCSU students were supported under this award in Year 1. Four of those were underrepresented minorities. Unfortunately, two of the five students left the University for family reasons near the end of the first year of PAARE. All five of the students received research opportunities and mentoring support from the SCSU faculty.

Note that three of the five Year 1 PAARE students received scholarships. The other two had full scholarships through other means, but did receive PAARE stipend funds for their participation during the summer and academic year.

The three students remaining at the beginning of Year 2 will participate in summer 2009 research activities. One will go to NOAO to work with Dr. Howell, one to Clemson to work with Dr. Leising and one will remain in Orangeburg to work with Dr. Walter. An additional 3 new students, all underrepresented minorities, will conduct research under Drs. Cash and Walter at SCSU. Thus, a total of 6 underrepresented minority students will receive research mentoring, stipends, room and board from PAARE in the summer of Year 2.

A total of four SCSU faculty members (Cash, Mayo, Smith, Walter) have received support in Year 1. They have been able to enhance their professional development and skills through travel, training and having funds to upgrade their research and educational resources. Additionally, Cash, Smith and Walter have received summer salaries and release time during the academic year. This has been critical to the success of the project since SCSU is not a research institution and faculty members typically teach four courses per semester for a total of eight courses within the academic year.

The project has also contributed by bringing the excitement and wonder of astronomy to the general public and K-12 communities. As described in the Outreach Activities section, over 3,300 people attended outreach activities under this award in Year 1. This is particularly important given that the state of South Carolina ranks low in science performance in K-12 and low in public scientific awareness.

Contributions to Resources for Research and Education:

Contributions Beyond Science and Engineering:

Conference Proceedings

Special Requirements

Special reporting requirements: None

Change in Objectives or Scope: None

Animal, Human Subjects, Biohazards: None

Categories for which nothing is reported:

Activities and Findings: Any Findings

Contributions: To Any Other Disciplines

Contributions: To Any Resources for Research and Education

Contributions: To Any Beyond Science and Engineering

Any Conference

Figure 1
Summer 2008 PAARE Interns at SCSU
(l. to r.) Patrick Durant, Graham Davis, Joshua Davis



Figure 2
SCSU physics major Graham Davis presents the results of his PAARE-funded research at the January 2009 AAS Meeting



Figure 3
SCSU physics major Jared Lalmansingh at KPNO in November 2008



Figure 4
SCSU undergraduate Jared Lalmansingh and Clemson graduate student Eric Bubar at the echelle spectrograph of the 4-meter telescope at KPNO in November 2008



Figure 5
SCSU PAARE undergraduate Patrick Durant (left) and NOAO astronomer Kenneth
Mighell (right) stand next to Durant's poster at the National Society of Black Physicists
meeting in Nashville, Tennessee, in February 2009

