



# SARA OBSERVATORY NEWSLETTER

Issue #9

Spring 2004

Florida Institute of Technology  
East Tennessee State University

University of Georgia  
Valdosta State University

Florida International University  
Clemson University

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## From the Editor's Desk

Ken Rumstay, VSU

Greetings, and welcome to another edition of the SARA Newsletter! So far 2004 promises to be a productive year for our consortium. A large contingent of SARA faculty and students converged on Atlanta in January for the annual winter meeting of the American Astronomical Society. Poster papers sporting the SARA logo were in abundance, and a special session, titled Research at Predominantly Undergraduate Institution, was organized by SARA.

In March came the spring meeting of the SARA Board of Directors, at Florida International University. In addition to the usual budgetary and telescope allocation activities, this meeting provided an opportunity for board members to view the final version of the new SARA video. It is a very professionally executed production, and should prove invaluable in publicizing SARA and its activities!

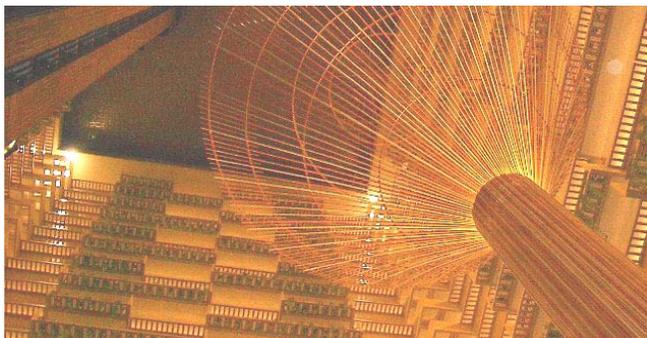
March also brought the sad news of the death of Dr. Janet Mattei, Director of the AAVSO. We shall miss her.

Eleven students have been chosen to participate in this coming summer's REU program. Once again, SARA has succeeded in attracting a cadre of qualified undergraduates from across the nation, and from a variety of institutions.

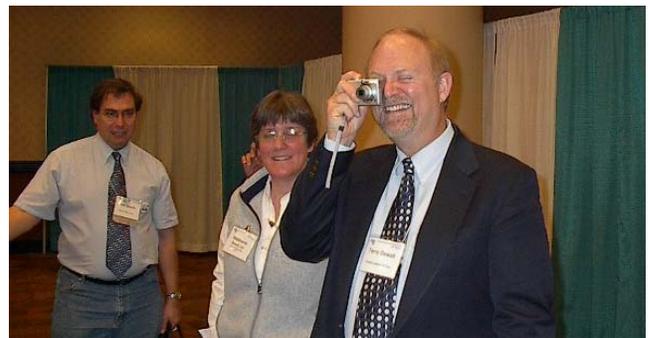
As summer approaches, we eagerly anticipate what will undoubtedly be the astronomical event of the year, the transit of Venus on the morning of June 8<sup>th</sup>. No living person has witnessed this rare event; the transit occurred in 1882! On behalf of the Southeastern Association for Research in Astronomy, I wish you all clear skies that day!



This lovely image of the Dumbbell Nebula in Vulpecula was obtained by Summer 2004 REU student Katie Hicks with the SARA telescope. (Image by Katie Hicks)



The American Astronomical Society met January 4-8 at the Hyatt Regency Hotel in Atlanta, Georgia. Coverage of SARA activities at the AAS meeting begins on page 2. (Photo by Ken Rumstay)



SARA sponsored a session on Research at Predominantly Undergraduate Institutions at the AAS meeting. Terry records the event for posterity. (Photo by Ken Rumstay)

## SARA at the January AAS Meeting

Ken Rumstay, VSU

The 203<sup>rd</sup> meeting of the American Astronomical Society, held January 4-8 in Atlanta, Georgia, and SARA was well represented there. Undergraduate students who participated in last year's REU Program were coauthors on nine papers presented at that meeting. The 2003 SARA REU program was described in the previous issue of this newsletter (No. 8, Autumn 2003). The paper numbers and titles of the abstracts submitted by our students are reproduced below; the complete abstracts may be found in the *Bulletin of the American Astronomical Society*, volume 35, no. 5. Seven of our REU students were fortunate enough to be able to attend; for most it was their first professional meeting. Many additional papers (listed on page 3) were presented by faculty members from the six SARA schools.

On Wednesday, January 7<sup>th</sup>, SARA sponsored a special session (Session 100) on Research at Predominantly Undergraduate Research. We began with presentations by a panel of five astronomers, chosen to represent a wide variety of undergraduate institutions, and then was opened to general discussion. The panelists (along with their presentation titles) were:

Matt Wood, Florida Institute of Technology: *The SARA Consortium: Providing Undergraduate Access to a 0.9-m Telescope at Kitt Peak National Observatory*

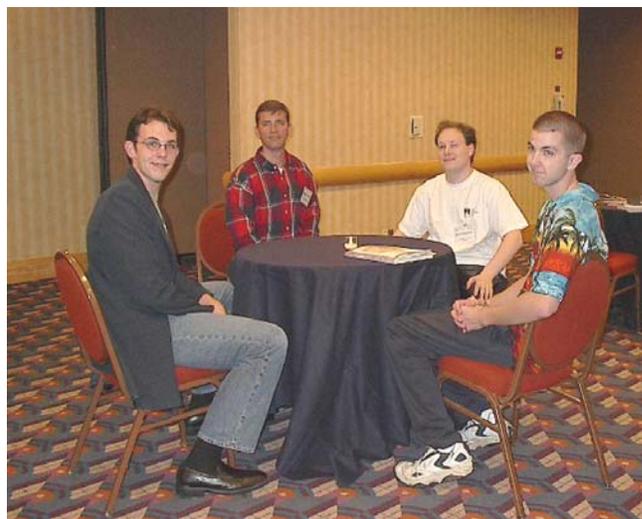
Leslie F. Brown, Connecticut College: *The Past, the Present and the Future of Undergraduate Research in Astronomy at Connecticut College*

Daniel B. Caton, Appalachian State University: *Research at Appalachian State University's Dark Sky Observatory*

Kathy D. Eastwood, Northern Arizona University: *Undergraduate Research at Northern Arizona University*

Edward F. Guinan, Villanova University: *The Exciting World of Search and Discovery: Research Experiences as part of the Undergraduate Astronomy Curriculum*

The session was attended, drawing well over a hundred participants. The high level of research activity at smaller colleges and universities was clearly evident!



Participants in SARA's 2003 REU Program become reacquainted at the reception on Sunday evening. (Photo by Ken Rumstay)



Dr. Martha Leake describes the astronomical research programs conducted at Valdosta State University. (Photo by Ken Rumstay)

### Presentations at the January AAS Meeting by Participants in SARA's 2003 REU Program

- 4.12 *Modeling Nucleosynthesis: Web-Based Tools*, by S.J. Robbins, B.S. Meyer, and G.C. Jordan
- 8.03 *Multiple-Wavelength Monitoring of Mira-Type Stars for Microvariability*, by W.K. Teets and G.D. Henson
- 9.01 *Classification of Variable Stars in the OGLE-II Database*, by C. Hendrik and J.S. Shaw
- 54.03 *A Search for Variability Among Cool Blue Degenerate Stars*, by M.A. Rudkin, T.D. Oswalt, K.B. Johnston, E.A. Wennerstrom, J.J. Schaefer, and J.J. Bochanski
- 54.04 *Further Study of A Young DAO+dK6 System Using Photometric Time Series*, by S. Rafferty, T.D. Oswalt, M. Rudkin, T. Heinz, K.B. Johnston, and E. Wennerstrom
- 55.05 *New and Revised Magnitudes for Stars Within Four Arcminutes of Selected Active Galaxies*, by S.E. Eyermann, K.S. Rumstay, R.H. Boone, and S.R. Cortes
- 57.05 *The COBE DIRBE Point Source Catalog*, by B.J. Smith, S.D. Price, and R.I. Baker
- 83.05 *Blue Metal-Poor Stars*, by S.R. Cortes and J.R. King
- 140.01 *Updated Eclipse and Oscillation Ephemerides for DQ Hercules*, by J.R. Robertson and M.A. Wood

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## Presentations at the January AAS Meeting by SARA Faculty and Students

- 12.04 *Orbital Solutions and Absolute Elements of the Eclipsing Binary AR Mon*, by R.M. Williamon, J.R. Sowell, and W.V. Van Hamme
- 12.15 *New Photometry and Results for the Overcontact Binary W Corvi*, by W. Van Hamme and R.M. Branly
- 19.08 *Astronomical Research at Valdosta State University*, by K.S. Rumstay, M.A. Leake, and C. Barnbaum
- 39.03 *Determining  $^{44}\text{Ti}$  Abundances in Cas A with X-ray Astronomy*, by M.F. Theiling and M.D. Leising
- 39.09 *Growth of Carbon Solids in Supernova Ejecta*, by E.A.-N. Deneault and D.D. Clayton
- 44.04 *Mass Estimates from Cataclysmic Variable Nodal Superhumps*, by M.M. Montgomery and M.A. Wood
- 45.03 *Light Curves of the Unusual Type Ia Supernova 2000cx*, by J.C. Lair, M.D. Leising, P.A. Milne, and G.G. Williams
- 50.06 *Blind Extragalactic HI Surveys with the Arecibo and Green Bank Telescopes: I. Simulations and Strategies for Survey Design*, by R. Giovanelli, M.P. Haynes, K. Spekkens, C.M. Springob, K.L. Masters, A. Saintonge, B. Catinella, B. Kent, R.J. Maddalena, L. Magnani, and R.A. Koopmann
- 50.07 *Blind Extragalactic HI Surveys with the Arecibo and Green Bank Telescopes: II. Strategies for Map Construction and Signal Detection*, by M.P. Haynes, R. Giovanelli, C.M. Springob, A. Saintonge, K. Spekkens, K.L. Masters, B. Catinella, B. Kent, R.J. Maddalena, L. Magnani, and R.A. Koopmann,
- 78.11 *The Historical Calibrated Light Curve of Gamma-ray Bright Quasar PKS 1622-297*, by J.R. Webb, E.S. Howard, G. Azarnia, and B.R. Kent
- 87.03 *Rebrightening Episodes in GRB 030329*, by D.H. Hartmann, K. Lindsey, S. Klose, A. Zeh, and J. Greiner
- 88.01 *Microvariability Observations of BL Lacertae, OJ 287, and PKS 1156+295*, by E.S. Howard, J.R. Webb, J.T. Pollock, R.M. Branly, and A. Van Werven
- 100.01 *The SARA Consortium: Providing Undergraduate Access to a 0.9-m Telescope at Kitt Peak National Observatory*, by M.A. Wood
- 112.08 *Line Shape Diagnostics of Galactic  $^{26}\text{Al}$* , by D.H. Hartmann, K. Kretschmer, and R. Diehl
- 112.21 *CH 3 GHz Observations of the Galactic Center*, by L. Magnani, S. Zelenik, and B. Engebretth
- 115.21 *DDO 210*, by M. Iyer, C. Simpson, and D. Hunter
- 118.16 *Interpretation of Blazar Flux Variations as Music*, by J.R. Webb
- 119.07 *Galaxy Evolution: The Role of Supernova Feedback*, by D.H. Hartmann, J.M. Myers, J. Johnson, and L.-S. The

One SARA presentation was particularly noteworthy! On Thursday afternoon Jim Webb described his “Quasar Music”, formed by converting quasar light curves into musical tones. A portable sound system provided samples of his compositions to a very large and interested audience. Jim expounds further on the topic of Scientific Music on page six of this issue.

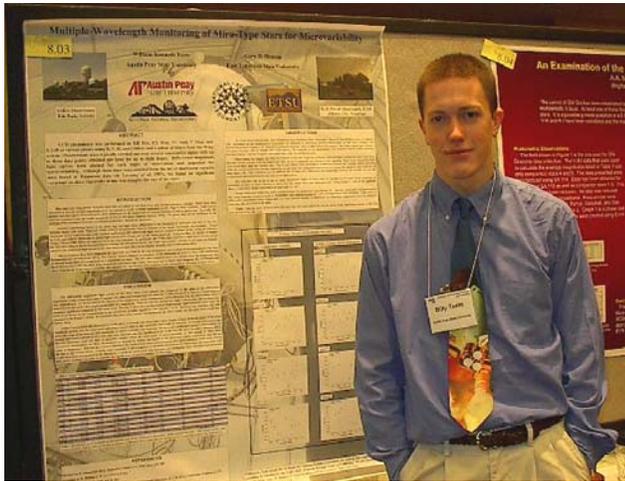


Stephanie Rafferty obviously takes pride in her photometric study of this DAO/dK6 binary system! (Photo by Ken Rumstay)

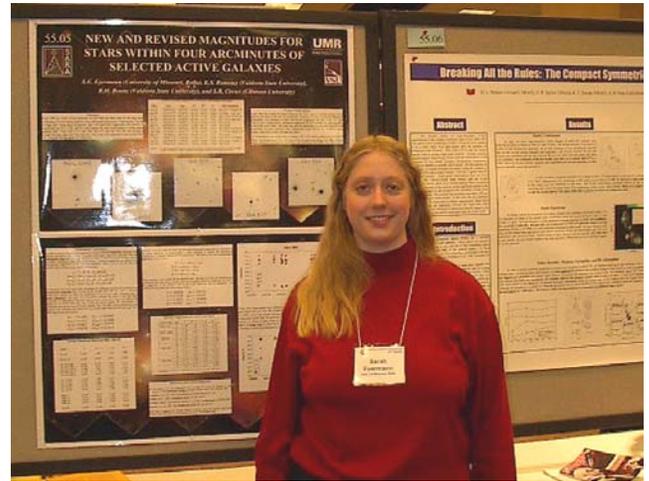
These annual meetings provide a welcome opportunity to reunite with friends and former students. I personally encountered no fewer than five of our REU students from past years, and I’m sure there are more that I missed. Many of these are nearing completion of their graduate programs, and will undoubtedly soon be sending their own undergraduates to our program!



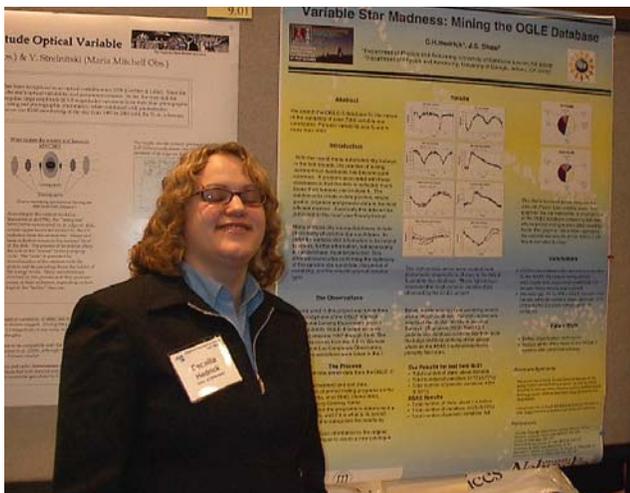
Observatory Director Jim Webb listens to a proposal from Lowell Observatory’s Bob Mills. (Photo by Ken Rumstay)



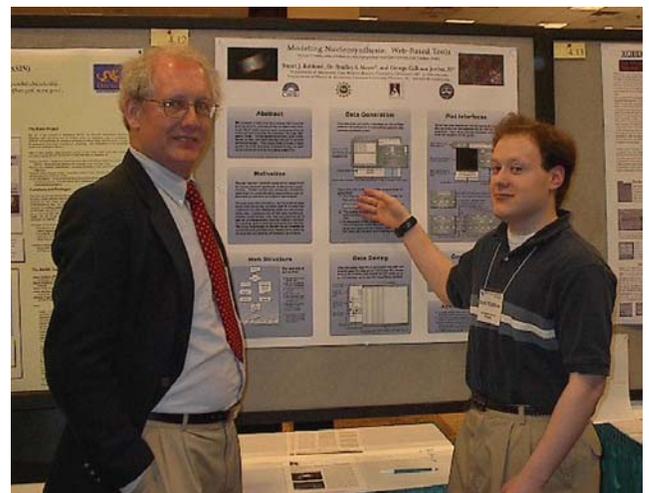
On Monday morning, Billy Teets presents his observations of microvariability in Mira-type stars. (Photo by Ken Rumstaj)



Sarah Eyermann spent last summer determining magnitudes for calibration stars in Seyfert galaxy fields. (Photo by Ken Rumstaj)



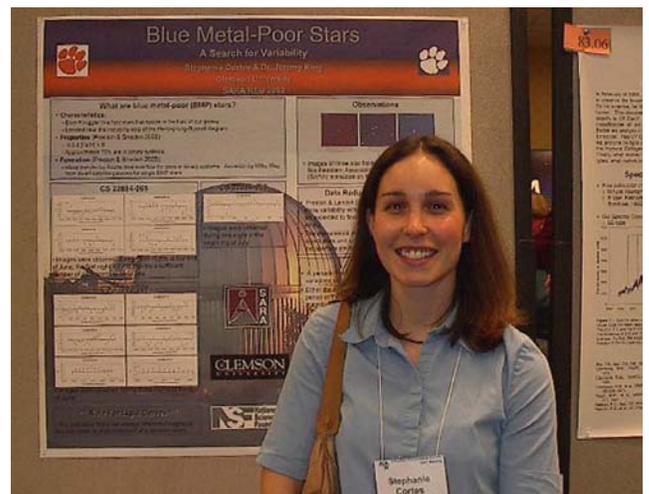
Cece Hedrick spent last summer with Dr. Shaw at UGA, mining the OGLE database for variable stars. (Photo by Ken Rumstaj)



Stuart Robbins describes the nucleosynthesis website he developed at Clemson to Dr. Shaw. (Photo by Ken Rumstaj)



John Robertson presents his research on the interacting binary star system DQ Herculis. (Photo by Ken Rumstaj)



Stephanie Cortes, a junior at Clemson University, spent the summer studying metal-deficient stars. (Photo by Ken Rumstaj)

The Spring 2004 SARA Board Meeting  
 Gary Henson (ETSU) and Ken Rumstay, VSU

The Spring 2004 meeting of the SARA Board of Directors was held on March 26<sup>th</sup> on the campus of the Florida Institute of Technology. In attendance were Gary Henson (ETSU), Scott Shaw (UGA), Ken Rumstay (VSU), Matt Wood and Terry Oswalt (FIT), and Jim Webb (FIU). Dieter Hartmann (CU) was unable to attend due to family matters.

Much of the meeting was devoted to the routine matters of establishing a budget for the coming six months, allocating telescope time for that period, and discussing technical problems with the SARA telescope. Some of the latter are summarized in the Observatory Director's Report at right. In general the telescope is in good health and remains completely subscribed, being used (onsite or remotely) on every clear night.

The new SARA video was previewed, and met with enthusiastic approval; it is a truly professional production! About twenty minutes in length, the video consists of a series of segments highlighting SARA's history, the six member institutions, and our REU program. This video should prove an effective recruiting and promotional tool.

The Board discussed several interesting proposals by which we might gain access to a second telescope in either the southern hemisphere or on the other side of the world. Any such endeavor would require that SARA grow to include at least one, and more probably two, new member institutions. Possible candidates for membership were considered; further information will appear in the next issue.

Following the meeting, we enjoyed a public lecture on cosmology and string theory presented by Jim Webb. A remarkably large crowd was in attendance; Jim appears to enjoy a widespread popularity in the Miami community!

The next meeting of the Board of Directors is slated for September 25<sup>th</sup>, at the University of Georgia.

Observatory Director's Report  
 (Summary)  
 James Webb, FIU

The SARA observatory is functioning well, with observing taking place on virtually every clear night. Since our last board meeting we have adopted a new policy which, on nights when weather conditions are stable, allows seasoned observers to continue observing after the remote observing assistant has left the mountain. During the previous six months 181 of the 185 available nights were subscribed; data were obtained on 97 of these. The four nights not requested occurred in January, coincident with the AAS meeting attended by nearly all SARA observers. Very few nights were lost to mechanical failure during this period.

The small format Apogee AP7 camera remains the workhorse of the observatory. The camera shutter continues to jam periodically during cold weather, even after its replacement some months ago. However, this has not hampered observers very much. An order for a camera with a wider field was cancelled after the manufacturer failed to deliver within a reasonable time period; a new order was placed with a different vendor.

The autoguider is used regularly by observers. It now operates out of two of the three possible quadrants, but is of somewhat limited use because the field of view is very small. Telescope pointing is much improved, thanks to calibration of the pointing model. We await installation of a new weather station, following failure of the old unit. In the meantime, observers rely upon weather data available on the web from the 2-m and 4-m domes.

In summary, this has been another great semester for SARA. Although little progress was made in improving the optics or the tube cooling, the telescope was rarely out of action due to technical problems. We look forward to installing a new weather station and a new wide-field CCD camera before the year ends.

The Summer 2004 SARA Research Experiences for Undergraduates Program

Student	Home Institution	Mentor
Andrew J. Benker	University of Nebraska at Lincoln	Dr. Loris A. Magnani (UGA)
Joshua C. Dolence	Florida Institute of Technology	Dr. Matthew A. Wood (FIT)
Cooper J. Downs	University of California at Santa Cruz	Dr. James R. Webb (FIU)
Heather L. Greene	Augsburg College	Dr. Matthew A. Wood (FIT)
Naydene R. Hays	Seattle University	Dr. Caroline E. Simpson (FIU)
Katie D. Hicks	Guilford College	Dr. Gary D. Henson (ETSU)
Jenni Kissenger	Florida Institute of Technology	Dr. Terry D. Oswalt (FIT)
Karen L. Menezes	University of Texas at Austin	Dr. Terry D. Oswalt (FIT)
Yelena Pelimskaya	Lehigh University	Dr. J. Scott Shaw (UGA)
Chase M. Rollins	Valdosta State University	Dr. Martha A. Leake (VSU)
Thomas J. Wark	Rowan University	Dr. Martha A. Leake (VSU)
Amanda Moffett*	East Tennessee State University	Dr. Beverly Smith (ETSU)

\* Supported by other funding sources.

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## Scientific Music

James R. Webb, FIU

What do science and music have to do with each other? Everything! While science explores the physical universe, music explores our mental, psychological and emotional world. Visually, astronomy has permeated our society with pictures and art, but astronomical music has yet to find its way into the public spotlight in a meaningful way. Realizing the importance of music in today's society, the late Nobel Laureate physicist Richard Feynman commented that the subject matter of our society's music helps to define our society. About science he said: *"Our poets do not write about it; our artists do not try to portray this remarkable thing. I don't know why. Is no one inspired by our present picture of the universe? The value of science remains unsung by singers: you are reduced to hearing not a song or poem, but an evening lecture about it. This is not yet a scientific age."* (Richard Feynman). Feynman's point is well taken: scientific music out there, and this article is your roadmap for locating it.

We must first distinguish between traditional music that is written about scientific topics, and experimental music that is created from scientific data. Traditional songs written about scientific topics include some that actually made the popular charts such as Elton John's *Rocket Man*, David Bowie's *Space Oddity*, Harry Nilsson's *Mr. Spaceman* and many others. Progressive rock commonly dealt with astronomical themes; some examples are Yes's *Starship Trooper*, Hendrix's *Third Stone from the Sun*, and Klaatu's *Calling all Occupants of Interplanetary Craft*. Jimmy Buffett frequently features astronomy in his songs, from celestial navigation in his early songs to an album entitled *Beach House on the Moon* that contains a variety of scientific songs including the title track and a not-so-positive song entitled *Math Sucks*. Even country singers got into the science act when Clint Black recorded Monty Python's *The Galaxy Song*. Outside of the popular music culture, much more educational science music can be found.

The website of the Science Songwriters Association (<http://www.science-groove.org/SSA/>) features numerous CDs of educationally-oriented scientific music. The site contains links to twenty-four artists who are actually educators or scientists and who record scientific educational music for all ages, from school children to adults. One example is the *a cappella* group *The Chromatics*, whose members started as a Space Telescope IDEAS grant and who have evolved into a performing and recording group which offer live performances and have created several CDs. Other artists include singer-songwriters who write and sing about evolution and the environment, and even rock bands who specialize in rock songs (such as *The Scientific Jam*) about science.

Scientific observations converted into sound provide an interesting alternative to traditional music. Instead of creating electronic music from nothing, why not let Nature do it for us? A pioneer of this form of music is Dr. Fiorella

Terenzi. Her *Music from the Galaxies* CD was released by Island Records and enjoyed world-wide sales. This led Dr. Terenzi to create an educational program containing poetry, music, and pictures to help teach astronomy. Ms. Terenzi also recorded more traditional music with scientific subjects such as NEOs (Near Earth Orbit) and *Quantum Mechanics*, a sort of disco physics tune. Quasar monitoring observations converted into sound, called *Quasar Music*, has been explored by this author; the resulting music was presented at the January 2004 meeting of the American Astronomical Society in Atlanta and was very well received. "Quasar music" has been included in several public programs at Florida International University, and in a self-produced CD album titled *Out in Space*. Some of the music from this CD was recently broadcast by the internet radio station *Radio Margaritaville* during an hour-long radio show (*The Warped Space-Time Hour*) hosted by the author.

SARA has other "scientific music" proponents among its membership! Dr. Matt Wood, who nearly made music a career before becoming a numerical astrophysicist, has composed a number of songs dealing with astronomy. Matt plays guitar and electric bass guitar. His *The SARA Song* has become the unofficial anthem of the SARA consortium and is appropriately featured in the new SARA video.

The author of this feature is an amateur guitarist who has written a number of astronomy songs and uses them for introductory classes, star parties and open microphone nights at local cafes. Many of his songs may be accessed in WAV format at [www.fiu.edu/~webbj/ASTROMUS.HTM](http://www.fiu.edu/~webbj/ASTROMUS.HTM), the author's music page.

Whether it is professional musicians singing songs about science, or professional scientists writing and performing music, astronomical and scientific music is out there. It rarely hits the charts, but it is more worthwhile listening to than much of the music hitting the charts today. Not only is it entertaining, it is also educational; a unique combination!



Jim Webb relaxes at home by strumming a tune with his favorite instrument. (Photo by Jim Webb)

News From SARA Institutions  
 Gary Henson (ETSU) and Ken Rumstay (VSU)

We are pleased to note that SARA Observatory Director Jim Webb (FIU) and REU Program Director Matt Wood (FIT) were both promoted to the rank of Full Professor at their respective institutions. These promotions are certainly well-deserved; congratulations to Matt and Jim!

Speaking of Florida Tech, their new Physics and Space Sciences building is nearing completion. The building will house office, laboratories, and one of the largest optical telescopes in the southeast. We wish Matt and Terry well as they prepare to move into their new home.

Ken Rumstay used the SARA telescope to participate in the AAVSO's international campaign to monitor the dwarf nova BZ UMa during a two-day period in April. His six-hour light curve appears below.

Finally, SARA is pleased to welcome a new member to its ranks! Dr. Richard (Rico) Ignace joined the faculty of the Physics, Astronomy and Geology Department at East Tennessee State University this past fall. Dr. Ignace received his Ph.D. in Astronomy from the University of Wisconsin. Before coming to ETSU he was a postdoc at the University of Scotland, a Lecturer at the University of Iowa, and a Scientist at the University of Wisconsin. His research interests are varied, with a focus on modeling as it relates to diagnostic approaches of astrophysical sources. Most of Rico's research touches on the topics of stellar winds, microlensing, and (more recently) extra-solar planets.

Rico is organizing an international conference on the Nature and Evolution of Disks around Hot Stars. Scheduled for 2004 July 7-9 at the Carnegie Hotel in Johnson City, this will be the first international astronomical conference to be hosted by ETSU. We wish them every success!

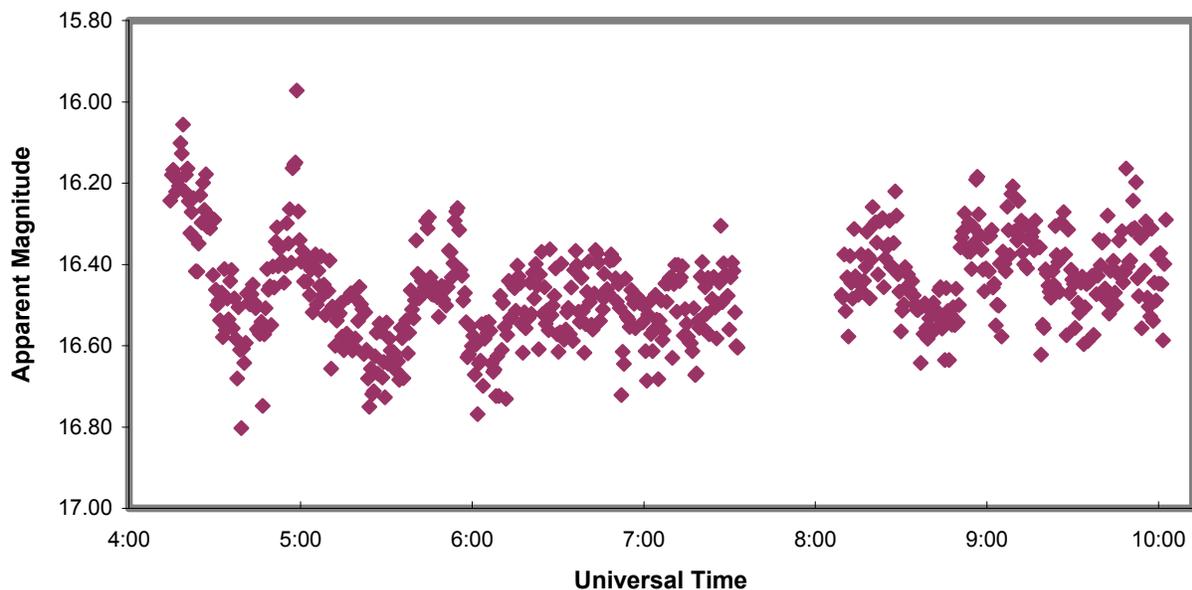


The new Physics and Space Sciences building at the Florida Institute of Technology is nearing completion! Note the dome for the proposed 32-inch telescope. (Architect's drawing courtesy of the Florida Institute of Technology)



The dome for the new campus telescope was lifted into place on April 15<sup>th</sup>. (Photo courtesy of the Florida Institute of Technology)

**BZ Ursae Majoris (2004 April 20; unfiltered)**



Brightness variations for BZ UMa, observed during the evening of 2004 April 19-20 with the SARA 0.9-m telescope.

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## News From Our Alumni

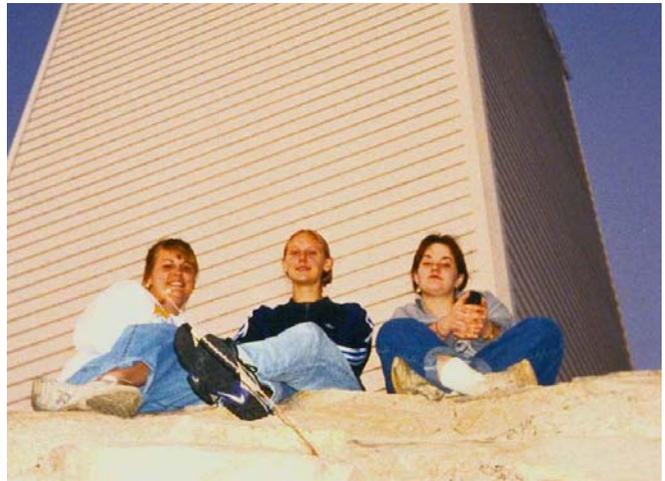
Ken Rumstay, VSU

In our last issue we heard from Roy Kilgard, who was Jim Webb's very first REU student in 1995. We recently heard from another of Jim's students who has gone on to do great things! Erin Strobel (now Erin Hicks), who joined our program during the summer of 1998. She writes:

"My introduction to studying active galaxies (while working with Jim Webb at FIU during the summer of 1998) was a great experience, one that led me to continue my research in galaxies. After my time with SARA REU I returned to my undergraduate institution, Washington State University, and completed my final year. I then moved to the University of California in Los Angeles to start graduate school. I worked on two different projects before starting my Ph.D. work. The summer before my graduate classes began, I constructed a J-band stellar spectral atlas that can be used to help understand composite stellar systems (i.e. star clusters and galaxies). In the second project, I compared galaxy star formation rate based on [O II] 3227A line flux to the more standard method of determination using Ha 6563A. It was with this second project that I earned my Master's degree in 2001."

"I am now working on my Ph.D. thesis, which focuses on the measurement of masses of the central black holes in Seyfert 1 galaxies. I have been lucky enough to travel to Hawaii several times to collect my thesis data using one of the Keck telescopes (as well as hike to flowing lava and do lots of snorkeling). We make use of the adaptive optics system to get high enough spatial resolution to measure the motion of the gas and stars within the central two arcseconds of the active nucleus. I have also used the Lick Observatory, which uses a laser guide star with its adaptive optics system. It is quite the sight to see a laser beam shooting out of the dome and into the sky! I am planning on completing my thesis by June 2005, so hopefully the next year will be a productive one."

"As for my life outside of astronomy, the biggest event has been getting married in the summer of 2000. My husband, Nate, went to Washington State with me and he is also working on his Ph.D. at UCLA in plasma physics. Outside of work we keep busy backpacking and training for triathlons. SARA provided a wonderful start to my career in astronomy, thanks to all! I hope everyone is doing well and I look forward to seeing you at future astronomy meetings!"



Erin Strobel (center) poses with students Hannah Curry and Emilie Hill in front of the McMath solar telescope. (Photo by Erin Hicks)

## In Memoriam

Ken Rumstay, VSU

We are deeply saddened to learn of the untimely passing of Janet Mattei on March 22<sup>nd</sup>. Director of the American Association of Variable Star Observers since 1973, Janet was a good friend of many of us in SARA. As a fitting tribute, minor planet 11695 has been named Mattei in her honor. We shall surely miss her.



Dr. Janet A. Mattei, Director of the American Association of Variable Star Observers for thirty years. (Photo courtesy AAVSO)

SARA Observatory Newsletter  
Issue #9 Spring 2004  
Kenneth S. Rumstay, Editor

The SARA web page is [www.saraobservatory.org](http://www.saraobservatory.org)  
This newsletter is available as an electronic PDF file

For paper copies, comments, questions or contributions,  
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