AMATEURS TEAM WITH LOCAL UNIVERSITIES

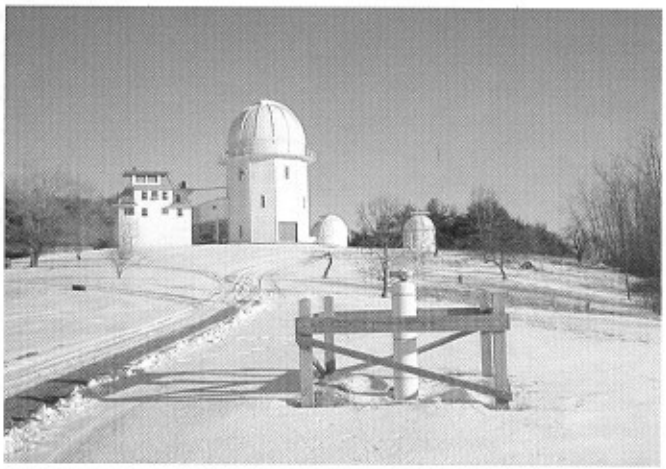
By Ted Forte

The Back Bay Amateur Astronomers of southeastern Virginia is embarking on an exciting journey that few amateur clubs get to enjoy. They have become full partners in a university observatory project that will open a world of real science to its members.

The club is based in Virginia Beach, Virginia, with residents of Virginia Beach, Chesapeake and Norfolk constituting the majority of the membership.

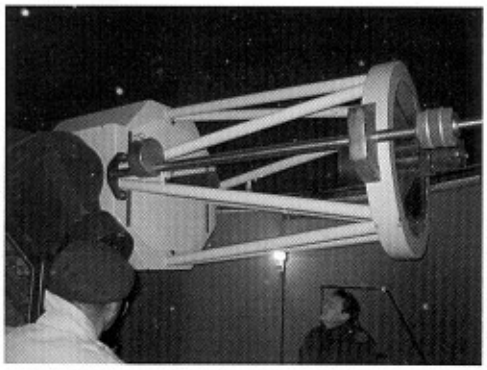
The Rapid Response Robotic Telescope is the brainchild of Dr. Carlos Salgado of Norfolk State University. He envisioned the telescope as both a way to accomplish research in gamma ray bursts and as a way to attract students to the fields of astronomy and physics.

We of the BBAA were introduced to Dr. Salgado when he accepted an invitation to give a talk to our club at a regular meeting. He surprised us by suggesting that we collaborate with the university in some form of public outreach activity. A number of members met with him and other representatives of NSU. He discussed several ways that we might work together to reach out to our community.



A view of the observatory from about where the RRRT will be located. In the foreground is a GPS station. In back, from left, are the observatory bunkhouse, the 40-inch dome, the 30-inch dome, and the 12-foot dome that contains an unused 10-inch reflector.

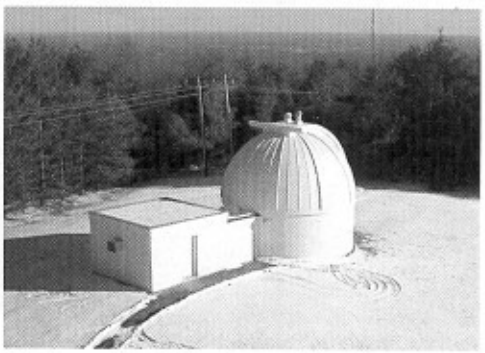
Not long after our initial discussions, Dr. Salgado invited us to send a representative to a meeting between NSU and the University of Virginia to discuss the possibility of collaborating on the RRRT observatory. UVA maintains an active observatory at Fan Mountain, not far from the UVA campus in Charlottesville, Virginia. Locating the RRRT at the Fan Mountain Observatory enabled us to utilize the existing infrastructure and thus make the new facility economically feasible.



Dr. Carlos Salgado of Norfolk State University looking up at the 30-inch telescope, which has since been refurbished and is now equipped with infrared detectors. The person with the beret is Dr. Floyd Miller of NSU.

Once a tentative agreement was struck between the two universities, funding was actively pursued. That funding eventually came from several sources including the Commonwealth of Virginia, the National Science Foundation, and NASA. The telescope manufacturer was selected through a competitive bid process. The successful contractor was Optical Guidance Systems of Huntington Valley, Pennsylvania.

The design of the instrument was shaped by the requirements of its principal science objective, the study of the optical and near infrared afterglows of gamma ray bursts (GRBs). These enigmatic bursts of high energy gamma rays are the most powerful events ever detected. They are extremely short-lived, lasting only minutes, sometimes only seconds; but the afterglows, longer wavelength remnants of the events, can last much longer. There is much scientific value in catching the event as soon as possible; instruments devoted to their study need to react very quickly. It was decided that a 24-inch aperture was a reasonable balance between light gathering capability and the need for rapid slewing. The final design is for an f/8, 24-inch Ritchey-Chrétien on a fork mount. A simple blockhouse observatory with a clamshell dome was selected as the best design to house the instrument. The observatory building will be



The dome of the 30-inch scope taken from the catwalk of the 40-inch dome.

constructed this summer and the scope is scheduled for delivery in November.

Once operational, the RRRT will become part of a global network of ground instruments that take triggers from NASA's Swift satellite, HETE-2, and eventually, GLAST. When a GRB is detected by a spacecraft, the network is alerted and the RRRT will rapidly slew to the position to take photometric and polarimetry measurements. Attempting to measure the polarization of the light from GRBs is something that very few instruments are doing, so it is hoped that the RRRT can make a contribution in this area. Dr. David McDavid of UVA will design and install the polarimetry instrumentation.

To be effective, the RRRT must be up and running every clear night. GRBs occur at the rate of about one a day. Some of those will go undetected, some will be below our horizon, and some will be too faint for the aperture. As a result, just a few events will be acquired and studied by the scope each year. That leaves lots of telescope time for other uses and that is where our club members come in. We will serve as the volunteer operators of the scope, keeping the instrument employed and in a ready status to respond to GRB triggers. The scope and its observing programs will be designed to accommodate rapid slewing to a GRB location.

Projects will include a number of observing programs that will be proposed to a telescope allocation committee; our club will have representation on that committee. Some of the proposed projects include automated supernova and NEO searches, variable star work, and perhaps even some extra-solar planet transit measurements. But the observing need not have scientific merit; many members will apply for time to image deep sky objects for purely aesthetic purposes.

The true power of the scope is perhaps in its potential as a source of inspiration and outreach. We hope to enlist area high school and college students to participate in the observing programs and will make the scope available for public observing opportunities. Norfolk State University has just begun offering a minor in astronomy and the RRRT is seen as a major incentive to attract students. Eventually the scope will function both

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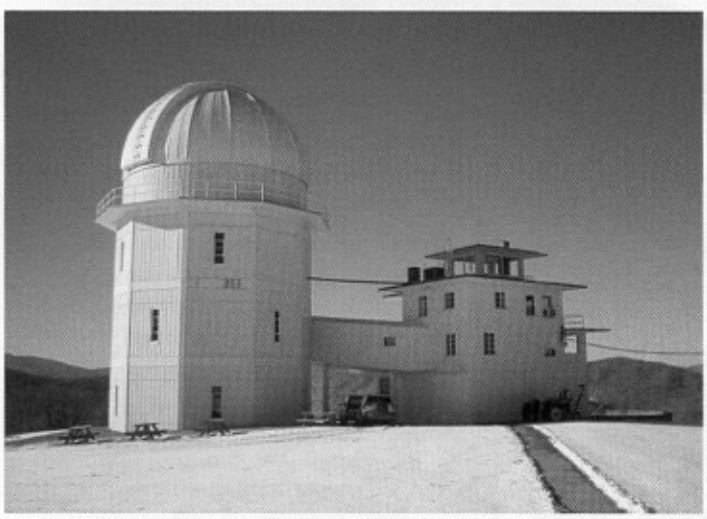


The main observatory building and the dome of the 40-inch telescope.

Photographs contributed to the Reflector

Bennie" Bobo" Negy Jr, a member of the Houston (Texas) Astronomical Society, took the following photographs of beautiful astronomical sights.

M16 and M17 were shot on hypered Fugi RD 100 film for 9 minutes with the 8-inch Schmidt Camera in Fort Davis on Skyline Drive at the State Park.

M51, and the region around M99 and M100, above, were both shot the same way: 10-minute exposures with an 8-inch Schmidt Camera at f/1.5 on hypered 2415 film at the Houston Astronomical Society's viewing site near Columbus, Texas. (There is a light scratch in the middle of the picture of M100.)

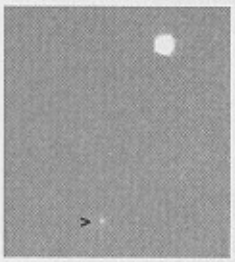
M51, the Whirlpool Galaxy.

Omega Centauri (NGC 5139) is a globular cluster of perhaps a million stars held together by each other's gravitational pull. It is one of the closest of the 150+ known globular clusters and is located in the constellation Centaurus, about 15,600 light years away and about 300 light years across. This photo is special to Negy because his mother, Edna Negy, was with him along with his father on a mountaintop in Fort Davis, Texas, when he coaxed her into taking an astrophoto of something simple. They used hypered Fugi RD 100 film, a Celestron 14-inch telescope as a guide scope for an 8-inch Celestron Schmidt Camera at f/1.5. She had never shot a picture of the sky before, but he was sure she could handle the guiding. With an exposure of three minutes, Bingo!, Mom has a nice shot of Omega Centauri on her first try. The photo was taken in May 1988 during the West Texas Star Party on top of Skyline Drive at Fort Davis State Park.

Finding Mercury in daylight skies

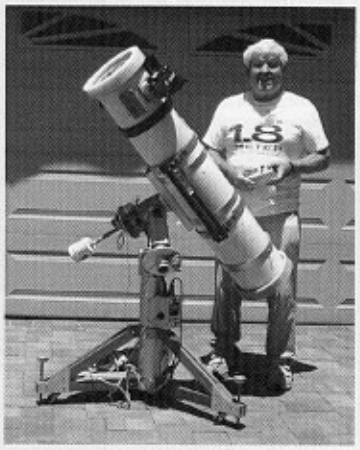
Currently 76 years of age, with eyesight not as good as years ago, seeing the planet Mercury with the unaided eye even in the evening sky had become not viable for me. That's why I enjoy looking at Venus which is three or more magnitudes brighter.

Then I read an article in the June issue of *Astronomy* magazine pertaining to the June 27, 2005, conjunction of the planets Venus and Mercury. The event took place around 9 a.m. on a Monday when the planets were separated by about 4.8 arc-minutes (Moon diameter approximately 30 arc-minutes). Encouraged, the possibility of seeing Mercury during the daytime gave me an idea and a challenge. I have seen Venus and Jupiter many times during daylight hours but never Mercury. I thought if I can easily find the planet Venus I should be able to see or photograph Mercury along side during this conjunction.



Venus, top, with Mercury below.

I brought out my 8-inch Newtonian telescope, home built in 1970, and mounted a Canon Rebel digital camera at the prime focus. The Rebel SLR camera can be attached to any telescope with a readily available T-Mount. It is also ideal in that the ISO speed can be quickly changed. Each digital photo registers the date and time to within a second, records the exposure used, provides a photo ID number, and each photo is instantly reviewable as a thumbnail view. Unwanted photos are easily deleted to make room for more exposures.



The author with his 8-inch Newtonian built in 1970.

To begin, I pointed my telescope at the sun, the input protected with a Baader Density-5 solar filter. I then set my setting circles to the sun's current right ascension (RA) and declination positions. The telescope is then repositioned to Venus' RA and Dec settings (removing the solar filter in between). Finding Venus was fast but I could not see Mercury in my 1.25 x 0.82 degree field of view. I photographed Venus anyway and downloaded my results to my eMac computer. With the use of my iPhoto software, which has a tremendous enhancement capability, I found that my photo included the planet Mercury! Photo taken at 10:30 a.m. on June 27, 2005, about 90 minutes after closest conjunction. ISO 100, exposure 1/500 second.
—*Ernie Piini*

Capturing the Goddess Selene

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compensation (+/- 1 stop) as a further precautionary measure so that all exposures would effectively be in triplicates (camera reading plus the two exposure for +/- 1 stop).

Fortunately, the exploratory work during 2004 which identified a shooting window of less than ten minutes was accurate, for the brightness of the moon was in balance with the immediate environment during these five minutes and which felt like eternity.

Using my "rule of thumb," shooting the rising full moon about 20 to 25 minutes after sunset, I am now studying the azimuth and altitude of the Parthenon for a similar exercise in 2006. So be it, for tempus fugit! ✶

Amateurs team with universities

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robotically and remotely. It is hoped that before long, students and amateur astronomers will be able to access the scope from their home computers.

The project has galvanized interest among club members. We have so far enlisted 19 members as active participants (our club has just over 100 members) and we expect that the number will grow as the project progresses. Our current volunteers are engaged in planning observing programs and performing some of the preliminary measurements, such as seeing assessments at the site. NSU provides training to BBAA members free of charge. A series of workshops are planned to help volunteer operators learn the processes and techniques that will be employed with the telescope. The first of these, on astronomical image processing, was conducted a few months ago. The project will no doubt open many new vistas for the club and expand its ability to pursue the goal of *"bringing astronomy to the people of Hampton Roads!"* ✶

The Reflector needs your stories and photographs

The Reflector is the magazine for the members of the Astronomical League. But it's not just for you, it should be about you. We want to publish your photographs and stories, but to do so takes action by you, the members. If your astronomy club has done something you'd like to see in the magazine, send the story and photographs to us.

If you have a story idea, or if you've written something you'd like to submit for