Contact: Steve Saucier 828-966-4097 (ssaucier@pari.edu)
John Avant 919-848-1153 (javant@pari.edu)

HISTORIC TELESCOPE COMES TO LIFE FOR STUDENTS AT PARI

Rosman, NC (June 22, 2016) – Decommissioned and lying dormant for 25 years, a historic radio telescope has been brought to life by a multi-year effort at PARI and is now being used by students for STEM learning.

PARI (the Pisgah Astronomical Research Institute) occupies the site near Brevard established by NASA in 1962 as one of the nation’s pioneer satellite tracking stations. The site was turned over to the Department of Defense (DoD) in 1981 and DoD installed a 12 meter (40 ft.) instrument for data collection. Not much is known about the data it collected, but it was used during the height of the Cold War and one clue is that the telescope was covered by a dome to keep Soviet satellites from knowing where it was pointed.

When PARI took possession of the site in 1999, the massive instrument was nonfunctioning, decommissioned by a lightning strike that destroyed the control processor power section. In 2012, PARI staff and volunteers began the process to recommission the instrument and make it available for science--- and learners of all ages.

“We achieved our first successful signal acquisition in late May,” said PARI Research Director Ben Goldsmith. “Significant progress has been made since then, to the extent that we are now receiving deep space data and signals that far exceed expectations.”

Goldsmith said the first use of the massive instrument is to temporarily replace a smaller telescope, nicknamed “Smiley,” that is used by students for a hands-on introduction to radio astronomy. “Smiley is one of the most popular radio telescopes in the world,” said Goldsmith, “having been used as an educational tool for more than 15 years at PARI. Controlled remotely via the internet, Smiley has been used by thousands of students from as far away as Australia. Smiley needs an overhaul, so we’ll be using the 12m as a replacement. When Smiley is returned to service next year, the 12m will be tasked as a research instrument.”
PARI Special Projects Consultant Ken Steiner was instrumental in getting the project started and spearheaded much of the restoration effort. “I first became acquainted with the 12 meter dish in 2003 when I visited PARI as a potential volunteer,” said Steiner. “I have an industrial controls background and was matched to the 12m because it needed new motors and drives. That was the start of a 13-year saga. We were not able to do much until funding became available in 2012. I enlisted the help of Rick Rudolph, a controls engineer with Wabash Electric in Bluffton, Indiana, and through his efforts Wabash became a key contributor. Wabash offered hardware at greatly reduced prices and provided extensive engineering support without charging. We also involved Western Carolina University engineering students to design a new counter weight system, and our involvement of students continues to this day. Colleen Lemmers, a summer intern from UNC-Greensboro, is now constructing a pointing model and will help students in the Duke TIP summer programs learn to use the telescope.”

The restoration of the instrument began with the installation of motors and drives. The dome was then removed and the entire instrument was pressure-washed and painted. Software controls were created that allow users to operate the telescope remotely via the internet. Finally, a new RF Chain was added to capture deep space radio signals emanating from hydrogen at a frequency of 1420 MHz.

“This project was an unbelievable team effort,” noted Goldsmith. “Ken Steiner played a key role and our IT staff, led by Lamar Owen and Mark Krochmal, provided the network and communications capabilities. Tim DeLisle created the software that allows us to move the instrument and collect data from space. Two key volunteers, Jeff Lichtman and Carl Lyster of Radio Astronomy Supplies, played critical roles in providing us with radio signal equipment and in testing. Almost the entire PARI staff and an army of volunteers worked three days to remove the dome, and volunteer John Boehme played the lead role in troubleshooting the system to make it operational.”

The 12m radio telescope, like two others on the PARI campus that are twice its size, is highly visible and accessible to campus visitors during normal business hours, 9-4 Monday through Saturday. “That was not always the case,” said Goldsmith. “The instrument’s use during the DoD days is shrouded in mystery, but we do know it was used in conjunction with satellites for almost 15 years as a rapid deployment and rapid response instrument. We believe it had several missions by the fact that the operations building next to the instrument had three bays that housed transfer truck trailers outfitted with different equipment for different tasks. The trailers could be moved out and new ones moved in quickly, with control and communications being changed by the connection of a few umbilical cords. We do know one thing for sure,” he added. “They didn’t want the Soviets to see it.”

Goldsmith also noted the irony of the telescope’s history. “This instrument was once hidden from view and accessed only by those with top-secret security clearance. Today, it is a popular spot for campus visitors and is being used to introduce students to a new way to
see and explore our universe. This summer the 12m telescope is a one-of-a-kind teaching tool for students in our Duke TIP summer camps. After that, it will be made available to students from around the world to examine star formations, stellar nurseries, the motion of the galaxy and the velocity of stars with respect to Earth. We think that’s real progress.”

**About PARI**
The Pisgah Astronomical Research Institute (PARI) is a public not-for-profit 501 (c) (3) organization established in 1998. Located in the Pisgah National Forest 30 miles southwest of Asheville, NC, the 200-acre campus is the former site of an historic NASA satellite tracking station. Today, PARI is a science education and research center. The site houses radio and optical telescopes, earth science instruments and the Astronomical Photographic Data Archive. Exhibit galleries display NASA Space Shuttle artifacts and collections of rare meteorites and minerals. PARI provides STEM educational programs at all levels, from K-12 through post-graduate research. For more information about PARI and its programs, visit [www.pari.edu](http://www.pari.edu).

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*Then: PARI’s 12m radio telescope as it looked during the site’s Department of Defense days, at the height of the Cold War. The instrument was covered in a dome so Soviet satellites would not know where it was pointed.*
Now: freed from the dome and totally recommissioned, the research-grade instrument is being used to introduce students to radio astronomy and probe the far reaches of space. PARI campus visitors can see the telescope and its controls from 9-4, Monday through Friday.

The results of two years of work appear on the terminal display: radio frequency signals emitted by hydrogen in deep space. Shown here are several of the PARI team members responsible for bringing the telescope back to life. Left to right: Ken Steiner, Ben Goldsmith, Daniel Hill and Tim DeLisle.