



26-Meter Radio Telescopes

The largest and most visible scientific instruments on the PARI campus are the two 26-meter (85ft) radio telescopes. Originally constructed by NASA for communications with satellites and spacecraft, the antennas could move at 3° per second across the sky. Weighing 750,000 pounds, with foundations extending 85 feet down into bedrock, the PARI 26-meter antennas were built to last. PARI has invested more than \$3 million to enhance the telescopes and adapt them for a slew rate of 0.5° per second and a slow motion slew rate of 15° per hour for radio astronomy celestial tracking

Students from NC A&T State University in Greensboro improved the mechanical balance and precision of each antenna by tuning the placement of counterbalance weights on each antenna and measuring the surface accuracy of the parabolic portion and feed placement.

Through a collaborative effort with Dr. Brian Dennison (UNC-Asheville), the radio telescopes are combined into a two-element interferometer with 2.2 GHz and 8.4 GHz receivers. The interferometer has been commissioned for observations of an astrophysical phenomenon called IntraDay Variables (IDVs). IDVs are poorly studied clouds of matter in the Milky Way Galaxy. PARI's radio telescopes measure changes in brightness from distant normally constant radio sources as they become obscured by these clouds of matter.

To improve pointing accuracy, a Small Pointing Optical Telescope (SPOT) has been added to each radio telescope. The SPOTs are used to track visible stars, providing precise measurement capabilities of stars during calibration to ensure accurate tracking in the radio portion of the spectrum. A student project, temperature control of the feed electronics, improves sensitivity and accuracy of data taken by each antenna.