



Radio Telescopes

The largest and most visible scientific instruments on the PARI campus are the two 26-meter radio telescopes. Originally constructed by NASA at a cost of about \$30 million for communications with satellites and spacecraft, more than \$3 million has been invested to enhance the two telescopes and adapt them for radio astronomy. Sensitive multiple frequency receivers are being used to study a phenomenon called IntraDay Variables (IDV). IDVs are unseen clouds of matter in the Milky Way Galaxy. PARI's radio telescope array is watching for changes in brightness from distant normally constant radio sources as they become obscured by these clouds of material.

Perhaps the best-known PARI radio telescope is the 4.6 meter antenna, nicknamed "Smiley" because a Smiley face was painted on the dish as a friendly wave to Soviet satellites during the Cold War era. Smiley is used remotely over the Internet by middle and high school students and teachers to study radio astronomy. Young learners investigate the rotation of the Milky Way Galaxy. PARI conducts workshops to certify teachers and has developed several lab exercises teachers use in their classrooms. The program has been supported by the NASA Space Telescope Science Institute IDEAS Program, the Z. Smith Reynolds Foundation, Progress Energy, American Institute of Physics Meggers Award Program and the American Astronomical Society. To date, more than 1000 teachers and student users have been certified and they have booked almost 8000 sessions totaling more than 27,000 hours. Smiley has been used by teachers and students as far away as Germany and Australia.

PARI has a 12m radio telescope that was recently recommissioned after being dormant for 25 years. Currently equipped with a 1420 MHz feed to measure neutral hydrogen, the 12m is being used by students in the Smiley program and is now available as a research grade instrument. One research project being planned for the 12m is a survey of the Milky Way Galaxy at 110GHz for CO measurement, and at 22.35GHz for water masers, which are regions of star formation. A similar survey has been completed in the Southern hemisphere but none have been conducted for the Northern hemisphere. The survey itself will take about seven years to complete and requires a dedicated precision surface telescope like the PARI 12m.

PARI operates a low frequency dipole antenna for studying the effects of Solar flares on the Earth's ionosphere and the effects of the interaction of Jupiter and one of its moons, Io. The project is part of a worldwide effort called Radio Jove, managed by astronomers at NASA Goddard Space Flight Center.

*PARI is a public not-for-profit organization. See www.pari.edu for more information.
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