

cific moment of time? Brian is demonstrating that you can move to a much more detailed depiction throughout the space environment. It's a novel and elegant way of doing it."

Combining their magnetic field data with electric field measurements collected by SuperDARN, a network of 12 ground-based polar radar antennas, Anderson and Waters also calculate that the Solar wind dissipates about 40 billion watts poleward of 60 degrees in quiet conditions. These calculations don't work when the Sun acts up, however, since geomagnetic activity moves the current systems to lower latitudes, outside of SuperDARN's range.

Indeed, a full view is one of the key advantages of piggybacking on the Iridium satellites, which encircle the planet at 780 km altitude. "It's the first time we can watch these currents evolve through an entire storm. We are not limited spatially or temporally," says Anderson.

But the piggyback ride nearly ended when the original owner, Iridi-

um LLC, failed to attract enough users to its pricey telephone services. The new Leesburg, Virginia-based venture, Iridium Satellite LLC, chaired by Dan Colussy, a former president of Pan American World Airways, will seek mainly industrial and government customers. The bailout was made with the help of a \$72 million contract from DOD, which buys the department two years of unlimited use for 20 000 people. DOD has its own gateway in Hawaii, and wants cryptographically secure phone service and global access for communicating in combat, polar, and remote areas. Iridium Satellite LLC has contracted with Boeing Co to run the satellites, and estimates total monthly operating costs of \$7 million. "There certainly is risk involved—and a high one at that," says Jose del Rosario, an industry analyst with the consulting firm Frost & Sullivan. "The potential is large, but it's a slow market." Still, the new company doesn't have to recoup the original \$5 billion investment.

TONI FEDER

Spy Station Retooled into Astronomy Institute

Fifty kilometers southwest of Asheville in the woods of western North Carolina, an abandoned satellite tracking station is finding new life observing heavenly objects of a different sort. Originally used by NASA for monitoring early space flights in the 1960s, then for National Security Agency (NSA) intelligence-gathering operations, the station's transformation into a radio observatory is now nearly complete. The nonprofit Pisgah Astronomical Research Institute (PARI) plans to boost educational astronomy programs in the area and eventually host visiting astronomers.

Facilities include a 4.6-meter, 12-meter, and two 26-meter radio tele-

scopes, and a new 0.2-meter optical telescope. Among the paraphernalia that PARI got with its purchase of the old spy station were part of a sophisticated security system; some bullet-proof windows; a tunnel; a paper shredding building; and a bunkerlike, white noise-producing conference room. In total, the site has about two dozen buildings.

The National Forest Service had planned to bulldoze the site, after being stuck with expensive maintenance since NSA abandoned it in 1995. But then Don Cline, a retired computer executive, stepped in. He bought other land, organized a swap with the Forest Service, and in early 1999 founded PARI—a several-million dollar investment that the institute will need to supplement with grants and donations. "It was a last ditch effort to save some

TELESCOPES turn their eyes from surveillance to science at the Pisgah Astronomical Research Institute near Asheville, North Carolina.

very useful astronomy equipment," Cline says.

The telescopes were in good shape, but to make astronomical observations, their tracking rate had to be slowed to the speed of Earth's rotation. That, says Mike Castelar, PARI's only full-time astronomer, was quite a challenge. "It was all analog electronics, and they were going three degrees a second." One of the 26-meter antennas has now been overhauled and can observe pulsars at 73 cm, the galaxy's background hydrogen radiation at 21 cm, and methanol lines from masers at 4.5 and 2.4 cm. The other large dish will be upgraded this summer, with the hope of eventually hooking the two together into an interferometer.

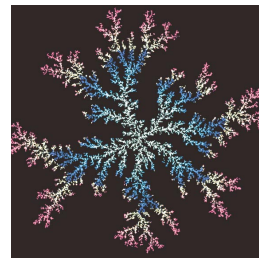
Education will be a major focus: About 30 undergraduate physics departments and even more primary and secondary schools are within a few hours' drive of the institute. PARI has purchased a portable planetarium, will host undergraduate research students this summer, and is planning continuing education workshops for teachers. And starting this spring, K-12 school groups will operate the 4.6-meter radio telescope via the Internet.

David Moffett, a radio astronomer at Furman University in South Carolina, plans to use the 26-meter telescope as a demonstration tool for undergraduate research. They'll monitor the brightest pulsars in the sky as well as observing masers. "It's an important resource because it's close," says Moffett. "It isn't cutting edge, but it's cutting edge for an undergraduate institution that doesn't have access to major facilities."

LYNLEY HARGREAVES

NEWS NOTES

Michigan theory center. "2001: A Spacetime Odyssey" is the title of the Michigan Center for Theoretical Physics's inaugural conference, to be held 21-25 May. That event will be followed in August by a workshop on pattern formation and diffusion-limited growth. In addition to conferences and workshops, the new theory center, based in the physics department at the University of Michigan, Ann Arbor, plans to host visiting scientists and postdocs,



PARI

