

Radio Astronomers Are Anxious to Head Off Satellite Interference at Millimeter Wavelengths

Radio astronomers are gearing up to fight for more protection of radio frequencies from electromagnetic interference, created mostly by mobile telephone and other satellite systems. The issues discussed at last fall's World Radiocommunication Conference (WRC-97) were largely peripheral to radio astronomy, says Willem Baan, who chairs the Inter-Union Commission on the Allocation of Frequencies for Radio and Space Sciences, or IUCAF, but "we're on the agenda" next time, in 1999. So the radio astronomy community has about a year to formulate proposals and to form alliances with other spectrum users to best fend off the growing commercial telecommunications interests.

Winning continued access to millimeter wavelengths will be a key goal, and allocation of frequencies above 71 GHz will be on the agenda at WRC-99. Radio astronomy currently has a significant fraction of the spectrum in this region, says John Whiteoak, deputy director of the Australia Telescope, who was present in 1979 when the allocations were made by the International Telecommunications Union, the United Nations body that runs the WRCs. But more is needed, says Whiteoak, who chairs an ITU working party on radio astronomy.

Millimeter wavelengths are used to observe molecular lines, and to measure, for example, radiation fields and the temperature and density of gases during star formation. And, since 1979, more powerful telescopes have been developed, and more molecular lines have been discovered, including ones in distant galaxies, for which wider bands are needed "to cope with redshifted frequencies," Whiteoak explains. "There's a lot of physics to be done there," agrees Baan. "From 60 to 1200 GHz, we are basically using every little hole in the atmosphere. We are ahead of the crowd—if others get interested in these bands, our good times will be over."

With growing pressure on the spectrum, it's not surprising that commercial interests are indeed developing technology for using higher frequencies. "If there have to be satellite downlinks, then we would need to place them where they do the least damage to other services," says Baan. "We can consider making quiet zones around observatories and we can share time. We must be creative. We don't need all of the spectrum all of the time. But we would like to at least have access."

In addition to millimeter wavelengths, the issue of signal spillover from adjacent bands and spurious emissions in about a dozen other frequency bands of interest to radio astronomers may be tackled at WRC-99. An IUCAF working group will come up with preliminary proposals for the conference in a few months. "The good thing is that we are not standing alone anymore," says Baan, referring to alliances with other passive (nontransmitting) services, safety services and pos-

sibly even with some active services—in which "we would let them use our bands, and they would let us use theirs." But Baan and Whiteoak also worry about the negotiations—because of the risk that radio astronomers could lose more than they gain, and Baan adds that it's important that more astronomers participate in fighting for spectrum protection. "WRC-99 may be our last chance to make big changes to the spectrum allocations."

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Dutch Telescope Gets New Director and Major Upgrade

Willem Baan, chairman of the Inter-Union Commission on the Allocation of Frequencies for Radio and Space Sciences, became director of The Netherlands' Westerbork Synthesis Radio Telescope this month. The array of 14 25-meter dishes has been in operation since 1970, and an upgrade, begun in the fall of 1996, is scheduled to be completed early next year, at a cost of 25 million guilders (about \$12.6 million).

The WSRT is used mostly to observe neutral hydrogen and molecular gases in galaxies. It is best known for studies that first indicated the presence of large amounts of dark matter in disk galaxies, and for pioneering studies on the structure and activity of radio galaxies.

The upgrade includes new hardware and software for speedier switching between observation frequencies and new receivers to increase the number and widths of observation bands—including two tunable wideband receivers for 250–400 MHz and 700–1400 MHz. The tunable bands will make the WSRT the first large radio telescope equipped to measure spectral lines as a function of high redshift, says Harvey Butcher, director of the Netherlands Foundation for Research in Astronomy, which runs the WSRT.

And the telescope will be used "to demonstrate that there is much science to do in this way," he adds, making it a first step toward a larger international project—the Square Kilometer Radio Telescope, which is in the early R&D stage. Baan notes that radio astronomers also plan to use the WSRT to test new ways of dealing with interference from man-made sources.

For Baan, the WSRT directorship has meant returning to his native country after 26 years in the US—the past 14 at Arecibo Observatory in Puerto Rico. Baan's research focuses on molecular megamaser galaxies, and he works actively on spectrum protection issues. He succeeded Hans Kahlmann, who served as the telescope's director for 22 years.

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UPGRADE IS UNDER WAY at the Westerbork Synthesis Radio Telescope.



WILLEM BAAN