Recent Examples of Technology Fostered by Radio Astronomy

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Metrology David Parker and John Payne of the NRAO have obtained Patent 5,455,670 for "Optical Electronic Distance Measuring Apparatus with Movable Mirror." This laser ranging device can measure distances to up to five different targets per second with an rms accuracy of 25 μm for a distance of 100m. It was built to align the surface and determine the pointing of the Green Bank telescope. It is being used by JPL for the Geographic Synthetic Aperture Radar project. Inquiries have been received from the Hobby Eberly Telescope and the French steel industry among others.

Cellular Telephone Location The federal Communications Commission requires that cellular telephone providers be able to specify the location of 911 calls in order to speed the arrival of emergency services. As a spin-off of radio astronomy interferometry techniques, Interferometrics, Inc. has designed a totally passive system that utilizes the difference in arrival times of 911 calls at different cell-towers within range. Haystack Observatory has participated in an upgrade to this system. A prototype system being tested in PA and NJ can find locations accurate to 500 feet.

Faulty Transmitter Location In another spin-off of radio astronomy, Interferometrics, Inc. has developed and operates a system that locates faulty transmitters that interfere with operation of communication satellites. The system uses the interfering signals received by satellites themselves to determine location by time-of-arrival and Doppler techniques. The offending transmitters are often at remote monitoring stations at oil and gas wells and the like.

Noise Characterization In 1988 Marian Pospieszalski of the NRAO published a noise model of a field-effect transistor low-noise amplifier. This model is now included in every CAD electronics simulator available commercially. This represents an enormous contribution to the ability to design any communications system. Research by Tony Kerr of the NRAO has also found its way to commercial software design systems: 5- port simulator in MMICAD and simulation of superconducting elements in the package offered by Sonnet Software.

Polarizers S. Srikanth of NRAO has designed a circular polarizer that operates over a full waveguide bandwidth. Because such polarizers are traditionally narrowband devise, this design has attracted attention and may find commercial use.

Contributions to LINUX The pioneering use of the Open Source LINUX operating system by the NRAO in its AIPS and AIPS++ software projects has had a beneficial effect on the entire online community. Before leaving the NRAO for a commercial firm developing LINUX systems, Jeff Uphoff, working with Olaf Kirsch (a LINUX pioneer), wrote *stadt*, the lock status monitor for the Network File System.