

70.07

**Multiwavelength Observations of Flat Radio Spectrum Quasars and Active Galaxies**

S. D. Bloom, A. P. Marscher (BU), W. K. Gear (ROE)

Recent results from the Compton Gamma-Ray Observatory (CGRO) show that all of the gamma-ray detected quasars and active galaxies (AGN) are radio-loud. These discoveries, and previous statistical studies with results from the Einstein Observatory suggest there is a strong relationship between strength of high energy emission and radio emission especially for compact, flat radio spectrum AGN. The synchrotron self-Compton process (SSC) could explain such a connection. We have observed a sample of flat spectrum radio loud AGN with VLBI, the VLA, the JCMT submillimeter telescope, UKIRT, and ROSAT. In addition, several of the objects have been detected by the EGRET instrument on CGRO. We use these data to compare the observed spectra with those predicted by the SSC mechanism.

70.08

**Interstellar Scintillation of the Intraday Variable Radio source 0917+624**

B.J. Rickett (UC San Diego)

The rapid variations in flux of the radio source 0917+624 are analyzed to determine the contribution of refractive interstellar scintillations (RISS). An analysis is presented of simultaneous recordings of flux at wavelengths 3.6cm, 6cm, 11cm and 20cm made at Bonn with the 100 m telescope, (provided by A. Witzel, MPIfR). The variations are characterized by a time scale that increases from 3 hrs at 3.6cm to 18 hrs at 20cm. When the 3.6cm variations are smoothed with a time constant equivalent to the characteristic time at 6cm, the result is a series that is 90% correlated with the actual 6cm variations. Similar relationships exist between the 6cm and 11cm variations. Such behavior is not predicted by any of the intrinsic models for the variations, but is expected for RISS, in which the source diameter increases linearly with wavelength and is also greater than the scattered diameter. The 20cm data show a somewhat different behavior. This could either be due to intrinsic source variations or to RISS from a 20cm source component substantially different from that at shorter wavelengths. The amplitude of the variations is also analysed versus wavelength and a model for the RISS and the source structure is proposed. The diameter at 6cm of the compact component is estimated to be between 15 and 100 microarcseconds.

The conclusion is that the major fraction of the variance in the cm wavelength flux of 0917+624 is due to RISS. Previous interpretations of "intraday" variations have relied entirely on intrinsic mechanisms, and have required extreme source models. Whereas the present study does not rule out intrinsic variations on times of a less than a day, it demonstrates that very compact sources exhibit rapid RISS, that must be included for a proper interpretation. The study also shows how these variations can help to refine our understanding of RISS and so of the microstructure in the interstellar plasma.

70.09

**The MRC/1Jy Radio Source Survey**

P.J. McCarthy, S. E. Persson (OCIW), W. van Breugel (IGPP/LLNL), V. K. Kapahi (TIFR)

We have selected a sample of radio sources from the Molonglo Reference Catalog with  $S(408) > 0.9\text{Jy}$ . The sources are restricted to declinations between  $-20$  and  $-30$ , and  $|b| > 15$ . The sample contains 540 sources, 30% of which are identified on the southern sky survey films. We have identified 83% of the sources and have obtained redshifts for 185 objects, 20 of which are narrow-lined galaxies with  $z > 2$ . Near IR and optical photometry of these galaxies are being used to explore the color and luminosity evolution of massive radio galaxies beyond the range reached by previous studies. Preliminary results provide strong evidence for early formation redshifts.

**Session 71: Instruments and Techniques  
Oral Session, 10:30 am–12:00 pm  
Durham**

71.01

**The NASA High Resolution Microwave Survey**

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The NASA High Resolution Microwave Survey (HRMS) began a decade of planned observations to search for signals of extraterrestrial intelligent origin with inaugural ceremonies at two sites on October 12, 1992. At Goldstone, California the Sky Survey began executing precisely controlled scanning patterns on the celestial sphere using a new beam waveguide 34m antenna operating at a frequency near 8500 MHz (X-band). At Arecibo, Puerto Rico the Targeted Search began tracking GL615.1A, one of 24 solar-type stars selected for these inaugural observations, using the NAIC 300m radio telescope operating in a band of frequencies centered at 1406 MHz. Since the initiation of the search, the Sky Survey has completed X-band observations of several dozen sky-frames measuring  $30^\circ \times 1.5^\circ$ . In addition, observations of selected areas of the galactic plane have been observed in several frequency bands (1400 MHz and 1600 MHz) using a 26m antenna located near the 34m antenna. The Targeted Search has completed the first 200 hours of observations at Arecibo covering some 300 MHz of bandwidth. This paper summarizes the results of the observations to date, including a synopsis of the interference observed at the Goldstone and Arecibo sites, and a discussion of techniques that will be used to improve future observations.

The HRMS program is managed by the Ames Research Center in collaboration with the Jet Propulsion Laboratory. The results presented in this paper represent the efforts of a team of scientists and engineers at these two institutions as well as the SETI Institute, Silicon Engines Inc., John C. Reykjalain Inc., Sverdrup Technology, Sterling Federal Systems, Cornell University, the Harvard-Smithsonian Center for Astrophysics, the American Astronomical Society, Arecibo Observatory, UC Santa Cruz, the University of Washington, UC Berkeley, California Institute of Technology, Georgia Institute of Technology, Innovative Systems, and the Space Telescope Science Institute.

71.02

**Improvement of IR Photometric Passbands**

E.F. Milone, C.R. Stagg (RAO/U. Calgary), A.T. Young (SDSU/ESO)

We have followed the recommendations of the IAU Commission 25 Working Group on Infrared Extinction and Standardization and designed a new set of passbands for the near and intermediate IR which are minimally affected by water vapour, and should provide more reliable transformations compared with both past and present versions. Atmospheric window transmissions have been calculated using MODTRAN, and Kurucz's (1991) stellar atmosphere models have been used as sources, to model the atmospheric extinction under different water-vapor, height, and airmass conditions. We have devised and computed a figure of merit related to the curvature of the extinction function to describe the sensitivity of each response function to variations in water-vapor extinction. On the basis of a large number of numerical experiments and simulations and the figure of merit, we recommend an improved set of passbands, optimized for reproducibility and transformability of photometric results, minimizing the Forbes effect and thermal emission, but broadened as much as possible to increase throughput. This work has been supported by NSERC and University Research Grants to EFM.