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# The University of Michigan Centimeter-band Blazar Monitoring Program: multi-frequency, time-resolved, flux and polarization observations as probes of the physical conditions in blazar jets

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The University of Michigan 26-m paraboloid (UMRAO) was dedicated to observations of AGN, primarily of the blazar class, for nearly 40 years providing continuous light curves for hundreds of sources. In 1977 the telescope was placed under automatic computer control permitting nearly round-the-clock operation and systematically-obtained measurements of both linear polarization and total flux density at 4.8, 8, and 14.5 GHz. The sampling probes variations on time scales of weeks to months, with the individual observing cadence selected on the basis of activity; both flux-limited samples and targeted, flaring blazars were observed. During 2002-2012 multi-frequency circular polarization observations were also obtained for a sample of bright (S>5 Jy), flaring sources. Analysis of time segments of the total flux density data have identified characteristic variability time scales of a few years, and quasi-periodicity. Cross-correlations of the UMRAO data with X-ray and gamma-ray light curves have been used for localization of the high energy emission and are most successful in identifying causally-related flares when multi-year data trains containing strong flares are included. The co-spatiality of the optical and radio-band emission has been investigated during contemporaneous GeV-flaring by looking for correlated variations in the optical and 14.5 GHz electric vector position angle light curves indicative of similar local magnetic field orientation; a similar approach has potential for the high energy bands when well-determined, high-cadence polarimetry becomes available. The UMRAO data support a scenario in which the quiescent jet in the blazar zone contains a turbulent magnetic field which is compressed and ordered by propagating shocks during strong flares. Radiative transfer modeling incorporating this scenario is being used to elucidate the intrinsic flow conditions during gamma-ray flaring.

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