

nature of the so-called central engine, which supplies the energy needed to accelerate beams of particles to relativistic velocities.

One of the most exciting discoveries in recent years was reported in the paper by Krichbaum *et al.*, who detected radio emission from several quasars and blazars that appear to vary in strength by some 10 percent on the surprisingly short time scale of only a few hours. The reality of the rapid variations was convincingly demonstrated by simultaneous observations, made with the 100-meter radio telescope in Germany and the Very Large Array telescope in New Mexico, with remarkable agreement to a fraction of a percent.

If the variations are intrinsic to the source, simple light travel time arguments suggest that the dimensions of the radiating region are incredibly small, less than a few light hours across. Even allowing for the effects of relativistic time dilation, the apparent size of the radiating region is too small to account for the high radio luminosity by the same synchrotron radiation process generally believed responsible for the radio emission from galaxies and quasars.

Attempts to interpret the observed variations as an extrinsic effect of the intervening medium are attractive because they avoid embarrassing theoretical problems. One idea is that the rapid variability is due to gravitational microlensing by stars located in intervening galaxies. However, the observed variations are wavelength-dependent, whereas gravitational effects should be achromatic. According to the discovery team, refractive interstellar scintillation from propagation effects in the interstellar medium "is a more plausible cause of the rapid radio variations" that they observed. However, in one of the most extreme examples, the radio variations are accompanied by rapid optical variations that appear to be correlated with them and clearly cannot be due to propagation effects through the ionized interstellar medium. Further observational and theoretical studies of intraday variability of blazars are expected to give a wealth of information about the physical conditions in the nuclei of galaxies and about particle acceleration mechanisms. If the correlation between intraday radio and optical variability of blazars is confirmed and extended to other objects, astronomers will be forced to interpret the variability in terms of an intrinsic phenomenon, presenting new challenges to their interpretation.

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