

40.06

Multi-Epoch VLBI Observations of the Quasar 4C39.25: Superluminal Motion Sandwiched by Stationary Structure

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We have obtained multi-epoch 2.8 and 3.6 cm VLBI maps of the $z=0.698$ quasar 4C39.25, which had previously been reported to be shrinking superluminally. The source has become considerably more complex relative to the 1970's, when it was described as a stationary double. The source now consists of 4 components, with the most compact structure on the western side. Three of the components remained at fixed positions relative to each other between June 1982 and August 1984. The second most eastern component, however, has been moving to the east at a rate of about 0.17 milliarcsec per year, which corresponds to $v=4.3c$ for $H_0=100$ and $q_0=0$. Possible models which might explain the occurrence of superluminal motion amidst stationary structure will be discussed. A.P.M. is partially supported by the NSF.

40.07

Models for Low-Radio-Frequency Variability in the Blazar AO 0235+164

S. L. O'Dell, J. J. Broderick, B. Dennison, K. J. Mitchell (Va. Tech), D. R. Altschuler (U. Puerto Rico), J. J. Condon, H. E. Payne (NRAO).

In most cases, temporal flux variations of extragalactic, compact radio sources at low frequencies (below about 1 GHz) and those at higher radio frequencies (above a few GHz) differ in character and show little relationship, except that a source must be a super-GHz (centimeter-wavelength) variable in order to exhibit sub-GHz (meter-wavelength) variability. Even in sources exhibiting both super-GHz and sub-GHz flux variations, the two regimes seem unrelated; indeed, there is usually little variability near 1 GHz--the so-called "Intermediate-Frequency Gap" (IFG).

On the other hand, a few extragalactic compact radio sources--the blazar AO 0235+164 among them--do exhibit major outbursts which appear to propagate from super-GHz to sub-GHz frequencies in an uninterrupted fashion, suggestive of an expanding cloud of synchrotron-emitting electrons. However, the standard expanding-cloud model (adiabatic, spherically symmetric, homogeneous) is not consistent with the data for any extragalactic, compact radio source. Modifications of the "standard" model, which can better account for observed super-GHz (and, for some sources, sub-GHz) flux variations, are developed. The predictions of such models are then compared with the observed radio-frequency behavior of the blazar AO 0235+164.

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40.08

3-Dimensional Models of the Evolution of Radio Jets

J.J. Mitteldorf, P.J. Wiita (U. Pennsylvania)

Preliminary results of a computer code capable of modelling some aspects of radio jet evolution will be presented. This work extends earlier computations based on the assumption of a relativistic ejected plasma emerging through a flattened confining gas cloud to allow for non-axisymmetric effects. The computations are not fully hydrodynamical as they follow the boundary between the internal relativistic plasma plus the shocked and swept up shell and the as yet undisturbed gas. Results concerning the bending of jets by pressure gradients or misalignment between the ejection axis and the larger scale gas symmetry axis will be presented. Future applications of this technique will be discussed. This work is supported in part by NSF grant AST 82-11065.

40.09

Solutions For Magnetic Fields and Surface Electric Fields Produced By Charged Particle Beams In Which Electrons (or Electrons and Positrons) Have Drift Velocities With Respect To Protons

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Observations indicate that highly collimated jets (i.e. charged-particle beams) are emitted from active galactic nuclei and quasars. If these jets are e^-p or e^-e^+p beams and the electrons (or electrons and positrons) are slowed with respect to the protons then magnetic fields will be produced within the beam. The drift velocities of the electrons (electrons and positrons) may be the result of an interaction between the jet and interstellar gas or, if the jet is relativistic, the drift velocity may be the result of inverse Compton radiation or synchrotron radiation in an external magnetic field. In this paper, I will describe solutions for the magnetic fields and surface electric fields produced in cylindrically symmetric charge-neutralized beams for a wide range of physical input parameters and briefly discuss the significance of these solutions from the point of view of explaining radiation from active galactic nuclei and quasars.

Session 41: Solar Physics**10:30-12:00 (Informal Lounge)**

41.01

Solar Hard X-Ray and UV Continuum Bursts Simultaneous to Within 0.1s.

L.E. ORWIG, B.E. WOODGATE, and M.P. NAKADA (NASA/GSFC)

The close temporal correlation between the ultraviolet line emission from OV (λ 1371A) and hard X-rays above 30 keV has been previously established from a study of impulsive solar flare features using data sets from the SMM Ultraviolet Spectrometer and Polarimeter (UVSP) and the Hard X-Ray Burst Spectrometer (HXRBS).

Following the repair of SMM, simultaneous observations of an M4.6 flare that occurred on 20 May 1984 at 0259 UT were carried out with the same instruments, this time with much higher time resolution. The UVSP made observations with ~ 75 ms time resolution in the UV continuum near 1600A with a 2.3A wide exit slit and an aperture of 10 arcsec x 10 arcsec. The HXRBS made count rate and 15-channel spectral measurements from 25 to 400 keV with 128 ms time resolution and count rate measurements in a single 25 - 400 keV band with 10 ms resolution.

A temporal comparison of the continuum UV and hard X-ray data for this event shows many corresponding impulsive phase emission features. In particular, a significant short spike (< 0.25 s full width) at 0259:23 UT shows simultaneity of the UV and hard X-ray emission to within the combined instrumental time resolution of ~ 100 ms. This result reduces the uncertainty in the simultaneity of some UV and hard X-ray solar flare features to nearly a factor of ten better than previously obtained and lends further support to the argument that both radiations originate rather low in the solar atmosphere. Such a result places severe constraints on models which attempt to explain impulsive phase flare phenomena and may be crucial in proving the existence, or lack thereof, of electron beams in the impulsive phase of solar flares.

41.02

Solar Hard X-Ray Bremsstrahlung Production by Proton Beams?

A.G. Emslie (U. Ala. Huntsville), J.C. Brown (U. Glasgow)

It has for some time now been accepted that hard X-rays produced during solar flares are due to elec-