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RECENT OBSERVATIONS AND SUPERLUMINAL MONITORING OF THE QUASAR 3C 395

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Until recently, the compact structure in 3C 395 could be described as follows (Simon et al. 1987):

(1) A bright, unresolved, flat spectrum core to the northwest. The core brightened by about 0.4 Jy between 1983.3 and 1985.4, from 0.6 Jy to 1.0 Jy.

(2) A moderately resolved component 15.8+/-0.2 mas to the southwest along P.A.118^{o}. The position of this component relative to the core has changed by less than 0.2 mas in 6 years and the flux density of this component has remained roughly constant.

(3) A component which was moving rapidly away from the core towards component (2) with a proper motion of 0.64+/-0.1 mas yr^{-1}. For 3C 395 (z=0.635), this implies (v/c)~20c for H_o=100 km/s/Mpc and q_o=0.5.

Thus 3C 395 appeared to show typical superluminal motion near its core, yet have an apparently stationary component at a projected distance of ~60pc.

In an 11-station experiment in November 1986 we re-observed 3C 395 and found a surprising result: the relative motion between components (1) and (3) in 3C 395 had apparently ceased between 1985.4 and 1986.9. In Fig. 1 we show the 4 maps at 6 cm. In Fig. 2 we plot the relative separation between the core and the moving component. The dashed line in Fig. 2 is a linear fit to the measured separation in the first three maps at 6cm.

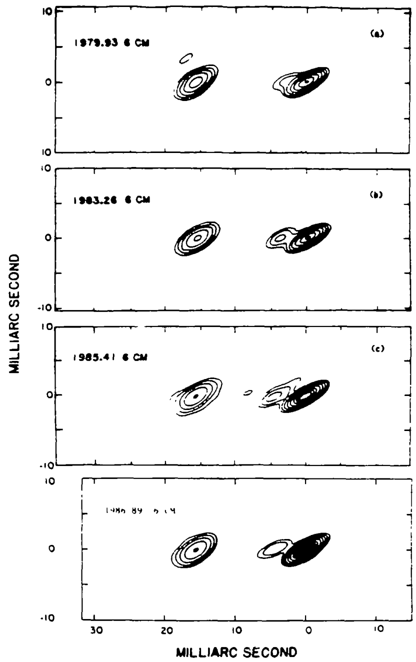

FIGURE 1: 6 cm images of 3C 395 for 4 epochs: 1979.9, 1983.3, and 1985.4 and 1986.9. All four maps have been rotated clockwise by 28 degrees and have been convolved with a beam 3x1 mas at -30^{o}.

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The core of 3C 395 has also brightened further from 1985.4 to 1986.9 by 0.2 Jy to 1.2 Jy. The core has roughly tripled in brightness since 1979.9.

There seem to be two possible explanations for the behavior we see in 3C 395. First, the moving component in 3C 395 may have actually slowed relative to the core. If so, this would be the first time a clearly defined component in a superluminal source has been seen to slow down. This would strongly suggest that the ambient conditions in 3C 395 change at this distance from the core and that the conditions which have created the stationary component at ~60pc may extend in as close as 15pc to the core (in projected distance).

A second possibility is that a new superluminal component has been ejected from the core of 3C 395 and that the separation measured is to its position and not to the nominal core position. This possibility would give a natural explanation for the observed flux density increase in the core and the apparent halt in superluminal motion in 3C 395. The discrepancy between the observed and linearly extrapolated positions of the moving component is ~1 milliarcsec, or more than a beam diameter, so this explanation faces some difficulties. However, in the most recent image from November 1986, the core of 3C 395 is slightly resolved on the SE side, implying that there is indeed a new component emerging from the core. If the separation between the true core and the stationary component is assumed constant, the apparent core position observed in November 1986 is less than ~0.3 mas from its position in earlier images.

There is limited evidence that the separations between the core and the other components in 3C 395 may be systematically lower at 18cm than they are at 6cm (Simon et al. 1987). If this turns out to be the case, it would suggest that the observations of Biretta et al. (1987) of similar behavior in 3C 345 may be a common property of superluminal sources.

It has been suggested (Biermann et al. 1987, in preparation) that stationary components in superluminal sources may be regions where the pressure in an expanding jet falls substantially below the external pressure so that a stationary, reconfinement shock forms. It should be possible to test this hypothesis in the case of 3C 395 by determining precisely the way the milliarcsec structure in 3C 395 is connected to the larger scale emission. At present, the most recent (Nov. 1986) observations of 3C 395 show that the edge of the stationary component closest to the core is ~unresolved whereas in the opposite direction the emission fades more gradually.

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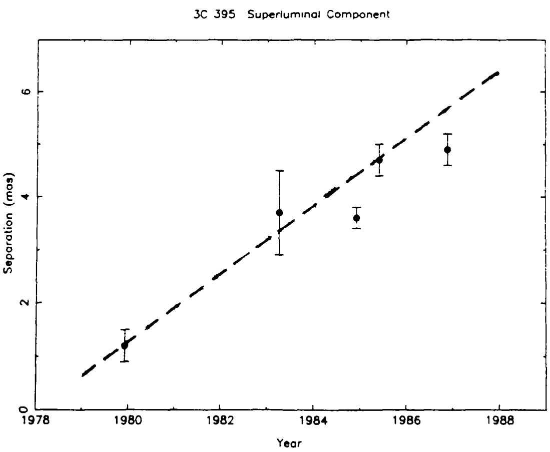

FIGURE 2: Separation as a function of time between the superluminal component and the core. The dashed line is the best linear fit to the first 3 6cm epochs. The point at 1984.9 was determined from model fitting at 18cm.

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