

VARIATIONS OF VLBI STRUCTURE IN UX ARI

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Five stellar binary systems of RS CVn and Algol type have been observed on June 12, 1986, with the EVN (Effelsberg, Jodrell, Medicina, Onsala, Westerbork), and two US antennas (Green Bank, Haystack). Observations were carried out at 5 GHz, with 13 min of integration and with MARK III mode B.

Four of the sources (i.e. HR 1099, AR Lac, SZ Psc and Algol), were detected on short baselines only, while UX Ari was observed on all the 21 baselines, thus allowing a more detailed discussion. The observed visibility amplitudes are reported in Fig. 1 (triangles), versus the projected baselines. Since radio emission from UX Ari has been reported to range from less than 10 mJy to more than 250 mJy, the 93 mJy maximum flux level detected during our VLBI run clearly indicates that the source was observed during a flare event, as it was during the previous VLBI observation by Mutel et al. (1985). Due to the limited UV coverage, only gaussian models have been used to fit the data, leading to a single component with a flux density of 60 mJy and size of 1 mas. With this model the brightness temperature of the source is $T_b = 4.2 \cdot 10^9$ K.

At the distance of UX Ari (50 pc), the separation between the binary components is 1.5 mas (16 Ro), and the sizes of the individual components are < 0.56 mas. Since the system was observed at phase 0.46 when the two stars are almost aligned, but not eclipsing, a source size comprized between the above values is fully consistent with the emission coming from an extended region comparable with the binary separation.

The visibility amplitudes observed by Mutel et al. are shown in Fig. 1 (dots). These have been interpreted as due to an unresolved core (size < 0.4 mas, flux density = 25 mJy), and a larger halo (3.2 mas, 120 mJy). Assuming that our single gaussian source coincides with the halo component, it appears to be of lower flux and smaller size than the halo component observed by Mutel et al.. The lower intensity and the absence of a core suggest that we are observing a flaring event when the rapidly decaying core had already disappeared and the halo was slowly fading away. The smaller size may be related to the different phase of the observation (0.46 versus 0.20).

Alternatively, we can interpret our observations as indicating a decreased intensity at the shorter spacings and a virtually unchanged

component at the longest spacings. By assuming the components' size from Mutel et al., we derive a flux density of 50 mJy for the halo and 25 mJy for core. From our data alone we cannot distinguish between the two hypotheses. However from physical considerations, a single extended component is a more plausible interpretation.

The scatter of the visibility amplitudes with respect to the fitting curves is well outside the error bars. These "fringes" in the visibility function, which are clearly present in both our and Mutel's data, suggest a multi-component structure within the halo.

References

Mutel, R.L., Lestrade, J.F., Prenston, R. A. and Phillips, R.B.: 1985, *Ap. J.* 298, 262.

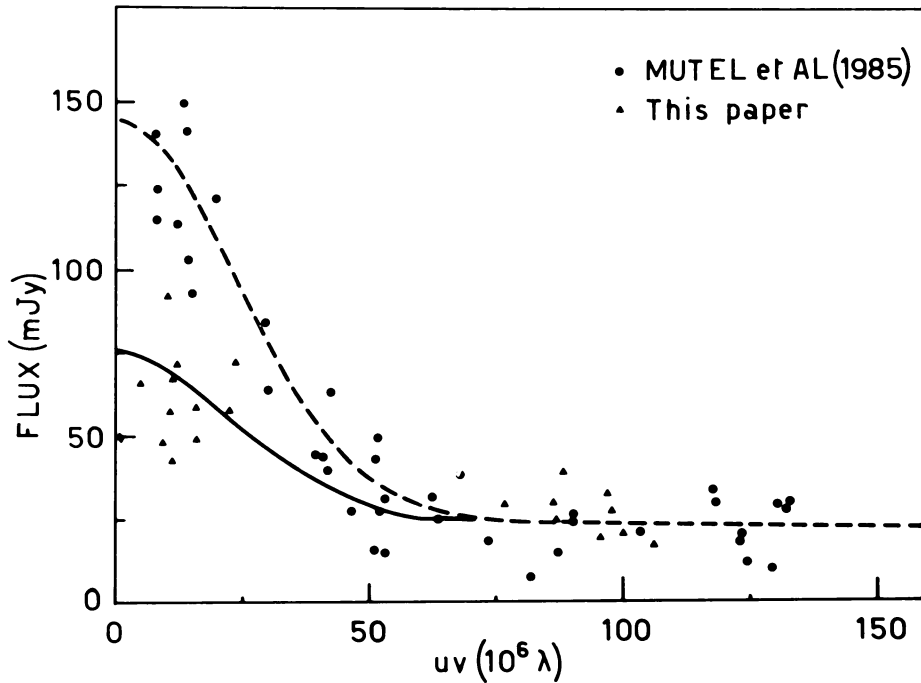


Fig. 1 - UX Ari Visibility Amplitudes