

200 MILLIARCSECOND STRUCTURE IN 3C 120⁺

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We present VLBI and VLA maps of the superluminal radio source 3C 120 ($z = 0.03$). The 18 cm VLBI maps shown in Figures 1 and 2c were constructed from a 14 station VLBI observation on 10, 11 October 1982. The map in Figure 1 is at full spatial resolution. The Figure 2c map was made from a uv-tapered data set and shows the extended emission. The VLBI maps show a jet ~ 175 pc long with distinct knots and bends ($H_0 = 55 \text{ kms}^{-1} \text{ Mpc}^{-1}$). The 18 cm jet smoothly connects to the 6 cm superluminal jet (Figure 2d). The VLBI jet remains well collimated through several bends and only begins to spread out 100 pc beyond the core. At 175 pc from the core, the jet is wide and weak, and disappears into the under-sampled region of the uv-plane ($< 2(10)^6 \lambda$'s).

The four maps in Figure 2 show structure ranging in size from the < 5 pc superluminal components to the 130 kpc extended emission regions. The 3C 120 jet is nearly continuously connected from the superluminal jet (p.a. = -110° , Figure 2c) through the larger 175 pc jet with a p.a. = -90° (Figure 2d) and into the 17 kpc jet in the VLA "B" array map (Figure 2b). Figure 2 shows the first clear observational evidence of a jet that is relativistic near the core, and is smoothly connected to a classical extended radio lobe. In the largest scale map (Figure 2a) an extended lobe is present south-east of the core. There is, however, no clear evidence for an eastern jet in the VLBI or VLA "B" array maps. In fact, for a $\gamma = 5$, the receding jet would be doppler suppressed by a factor of $\sim 10^{-6}$ below the approaching jet.

The VLA "B" array jet trajectory may be represented by a simple relativistic precessing jet model where $\gamma = 5$, $\theta_{\text{INCL}} = 12^\circ$ (consistent with the observed superluminal motions), $\phi_{\text{PREC}} = 9^\circ$, and a precession period $\sim 5 (10)^4$ years. The periodicity in the bends in the 175 pc VLBI jet may be represented by a 20 year nutation ($\phi_{\text{CONE}} = 1^\circ - 2^\circ$) on top of the precession period.

*The National Radio Astronomy Observatory is operated by Associated Universities, Inc., under contract with the National Science Foundation.

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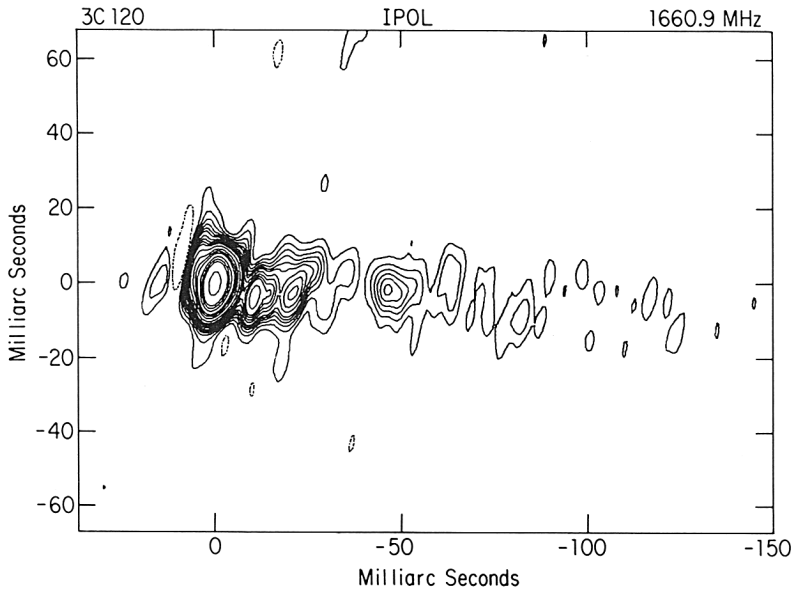


Figure 1.

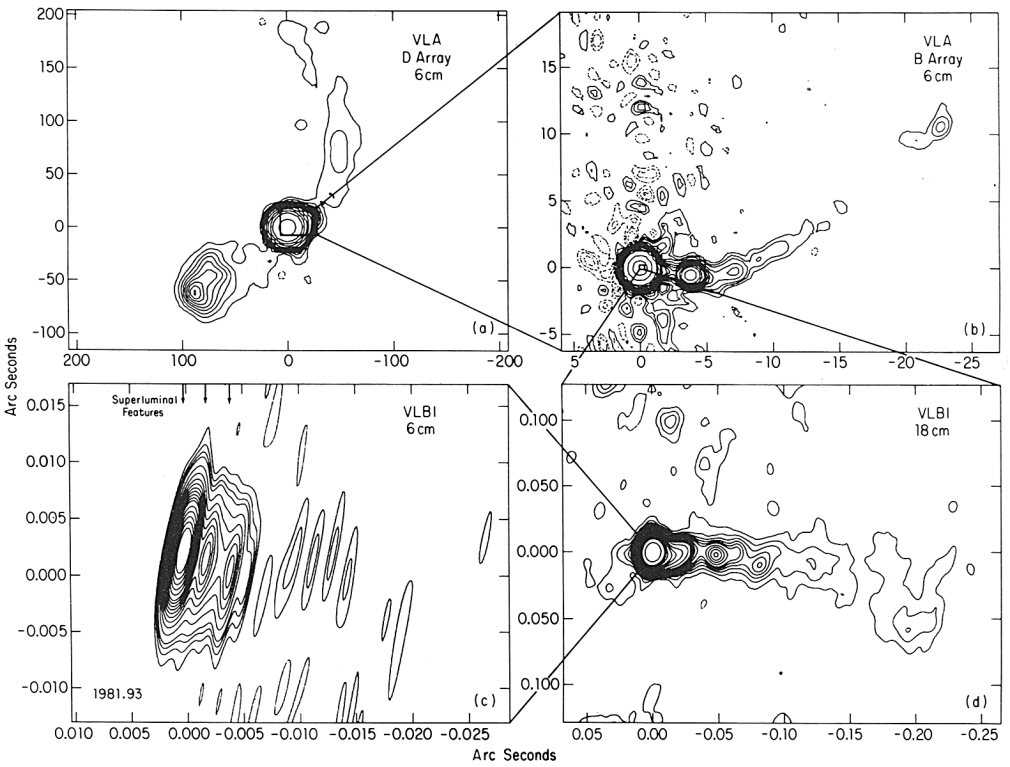


Figure 2.