

Westerbrook,

Sept. 17, 1979.

Dear Alan,

I enclose some data that might be relevant to the proposed paper on the collimation of the 3C 31 and M6C 315 radio jets. We've now made cross-cuts at 30" intervals along the jet and counter-jet in M6C 315 in the full-resolution WSRT 21 cm maps (see the enclosed plots). The main jet core clearly ~~is~~ be divided into 3 separate zones: a rapid expansion zone within ~ 2 arcmin of the nucleus (the VLA data obviously tells more about this region - the WSRT half-intensity widths are slightly greater than the values determined from the VLA data and given in the Ap J. letter paper on M6C 315, but the WSRT has many more short baselines and we are probably picking up additional flux), - a confined zone from $\sim 2'$ to $7'$ distance where the half-power intensity is very constant at $\sim 47''$ or so and then a free expansion regime from $\sim 7'$ to $\sim 15'$ where the peak at the outer end of the jet begins. The change from the confined zone to the free expansion regime is clearly associated with an area where the brightness of the jet sharply dips by a factor ~ 2 .

The counterjet shows the region of rapid expansion near the nucleus (within $90''$) and then a region of confinement out to $\sim 5'$ arc. The rate of expansion of the counterjet in the rapid expansion zone is clearly more rapid than that of the main jet and the counterjet is broader in the zone of confinement ($\sim 57''$ on average) than is the main jet ($\sim 47''$ on average). However the width of the counterjet does probably fluctuate in a significant way (there are clearly two significant peaks at $\sim 90''$ and $4'$ distance from the nucleus, while the width of the main jet seems more

constant over the distance between two and seven arcmin ~~to~~ from the nucleus.

The ~~end~~ beginning of the free expansion regime in the main jet coincides with a sharp increase in the degree of polarization from $\sim 40\%$ at 21 cm ($\sim 30\%$ at 50 cm) to $\sim 60\%$ ($\sim 45\%$ at 50 cm). Thus the free expansion regime has higher polarization than does the confined zone although the magnetic field orientation is entirely similar.

Best regards,
Tony Willis