INTERPRETATION OF SOME PROPERTIES OF EXTRAGALACTIC JETS IN THE CONTEXT OF A TWO COMPONENT MODEL

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We have studied a sample of extragalactic jets within the context of a two component model. This model supposes the existence of two flows in the extragalactic jets. An electron-positron fast beam coming from the internal regions of the accretion disk, responsible for the VLBI jet at the parsec scale and for the observed superluminal speeds. A second slow component, responsible for the jet observed at larger scales. The fast beam is destroyed when the parallel magnetic field is smaller than a critical value , $B_{II} < B_{\rm crit} = 3.2 \times 10^{-3} n_p^{1/2}$, where n_p is the density of the background thermal plasma of the slow component.

The present sample includes 9 FRIs, 12 WATs, 1 FRII, 1 CSS and 1 Core-Halo. The critical zone was determined by careful examination of published radio maps looking for regions along the jets where there was an important morphological change, like bright knots, gaps or strong sudden polarization changes.

The identification of the critical zone fixes the internal density n_p from the magnetic field, deduced from standard equipartition argument. This allows us to estimate the mass outflows and energy flux for the slow and fast components, $\dot{M}_0 = S_0 n_p m_e m_e V_0$, $\dot{M}_f = S_f \gamma n_f m_e c$, $K_0 = S_0 V_0 (n_p m_p V_0^2/2 + B^2/6 + 5 n_p KT/2)$ and $K_f = S_f \gamma^2 (\gamma - 1) n_f m_e c^3$. Cross sectional areas S_0 and S_f are deduced from the radio maps. We assumed $\gamma = 4$ and $T = 10^8 K$. We have taken the density of the fast beam $n_f = (n_p \times n_{\rm syn})^{1/2}$ to ensure $n_f/n_p \simeq 0.01$ and $n_{\rm syn}/n_f = 0.01$, where $n_{\rm syn}$ is the proper density of the emitting particles of the fast component. Two different approaches have been made for the bulk velocity: $V_0 = V_A = 0.02c$ where V_A is the Alfven velocity in the critical region and a maximal limit, $V_0 = \frac{V_A}{tg\alpha}$ where α is the opening angle of the slow component.

The results give new light on the classification of AGNs. A smaller ratio K_f/K_0 for the WATs than for the FRIs suggests a stronger influence of the fast beam in the FRIs. The energy flux distribution versus the distance to the critical zone shows that WATs extend themselves through a large domain of critical distances ($10 - 110$ kpcs), always keeping small values of $K_f/K_0 = 3$ (for $V_0 = V_A$) while FRIs are grouped near the short critical distances < 10 kpcs together with the remaining sources studied; however, the domain of K_f/K_0 (5-25 for $V_0 = V_A$) is much more extended. We found a certain tendency to higher nucleus activity (Lx) for higher $K_f s$ though we did not find data for all the sources. A larger sample should be studied to further investigate the possibility of a correlation between the large scale inflow $\dot{M}_{\rm cool}$ and the ejection from the slow component.

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