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Physical properties of the jet in 0836+710 revealed by its transversal structure
(Corrigendum)

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Perucho & Lobanov (2007) (PL07, from now on) presented results demonstrating that the jet in 0836+710 has a significant velocity shear layer. These authors used a set of jet parameters found by Lobanov et al. (1998) (including Lorentz factor $\gamma = 11$, Mach number $M_j = 6$, and jet/ambient medium density ratio $\rho_j/\rho_a = 0.04$). They studied different characteristic wavelengths that may develop in a jet with both a thin ($\simeq 10\%$ of the jet radius) and a thick shear-ayer ($\simeq 60\%$ of the jet radius). The result showed that the observed wavelengths in the jet structure could be more easily explained in terms of a transversally stratified jet.

A mistake was, however made in PL07: the equation used to convert the instrinsic into an observed wavelength was incorrect, because it included cosmological effects. The correct equation should have been

$$\lambda_{obs} = \lambda_{int} \frac{\sin \alpha}{(1 - \beta_w \cos \alpha)} . \qquad (1)$$

This correct treatment would reduce the values of the wavelengths obtained in Table 1 of PL07 by a factor of $\simeq 3$. This implies that their solutions both with and without a shear layer cannot explain the observed structures, which had been reported to be 100 mas and 7.7 mas (Lobanov et al. 1998), in terms of the jet parameters used to obtain the results shown in Fig. 1 of PL07.

Our necessary correction for this error leads to a reinterpretation of the results in PL07, which affects basically the identification of the unstable modes present in the jet. Our new identification is that of both the first body mode and a high-order body mode of the sheared-jet solution, which can account for the observed structures. Both modes might be triggered at the same frequency ($\omega \simeq 0.1c/R_j$), which would imply that the

driving mechanisms responsible were instead one. In this case, the short wavelengths could be triggered as harmonics of the longest excited one (Perucho et al. 2005). The new resulting frequency would be a factor of four higher than that given in PL07 for the longest wavelength. Thus, the driving period would then be now $T_{dr} \simeq 1.4 \times 10^7$ yrs, and similar to the one given by Hardee et al. (1994) for 3C 449.

In summary, this result leads to the same conclusion as PL07, where the mistake in the equation relating the intrinsic to the observed wavelength led to a misidentification of the active modes. In Perucho et al. (in prep.), we will present the details of our new analysis that provides the new identification of unstable modes growing in the sheared jet. The new results show that, while the order-of-magnitude discussion in PL07 remains valid, different interpretations remain possible. Any results are dependent on sources of error associated with the measurement of the jet radius, the thickness of the shear-layer, the viewing angle, and the parameters used for the jet.

References

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