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The first bent double lobe radio source in a known cluster filament: Constraints on the intra-filament medium

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We announce the first discovery of a bent double lobe radio source (DLRS) in a known cluster filament. The bent DLRS is found at a distance of 3.4 Mpc from the center of the rich galaxy cluster, Abell-1763. We derive a bend angle $\alpha=25\text{deg}$, and infer that the source is most likely seen at a viewing angle of $\Phi=10\text{deg}$. From measuring the flux in the jet between the core and further lobe and assuming a spectral index of 1, we calculate the minimum pressure in the jet, $(8.0\pm 3.2)\times 10^{-13}\text{ dyn/cm}^2$, and derive constraints on the intra-filament medium (IFM) assuming the bend of the jet is due to ram pressure. We constrain the IFM to be between $(1-20)\times 10^{-29}\text{ gm/cm}^3$. This is consistent with recent direct probes of the IFM and theoretical models. These observations justify future searches for bent double lobe radio sources located several Mpc from cluster cores, as they may be good markers of super cluster filaments.

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