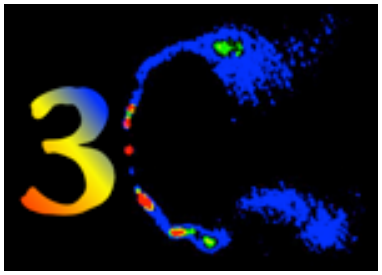

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Detection of Proper Motions in the Knots of the M87 (3C 274) Jet with the Chandra X-ray Observatory

Tuesday, 17 September 2019 16:30 (20 minutes)

We present results from two observations of the M87 jet taken with the Chandra High Resolution Camera (HRC) separated by ~5 years. We detect proper motions in knot HST-1 and knot D of 24.1pm1.6 mas/yr and 9.2pm2.6 mas/yr, respectively. This corresponds to superluminal velocities of 6.3pm0.4c and 2.4pm0.6c, respectively, along the axis of the jet. These velocities are consistent with the previously measured motions of the optical, ultraviolet, and radio components. Comparison of the multi-epoch X-ray and HST observations show that the knots are co-moving in the two bands. There are significant variations in the X-ray fluxes of these knots between the two observations with no corresponding variations in the optical. Assuming synchrotron losses, we estimate the magnetic fields of knots HST-1 and D to be ~420 and ~230 microG, respectively, consistent with the equipartition estimates. We conclude that synchrotron loss is the primary mechanism responsible for the changes in X-ray fluxes of these knots, and that the proper motions of the knots reflect the underlying velocity of the jet. In this presentation, we will describe our observations, discuss our results and implications for our understanding of the M87 jet, and outline future work.

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