The Physics of Jets in the Chandra era

Rita M. Sambruna(*George Mason University*)

[Invited Review Talk, 30 min.]

Abstract

The advent of Chandra is revolutionizing our understanding of the physical properties of extragalactic jets. The discovery of a bright X-ray jet in the Chandra "first light", the distant quasar PKS 0637-752, showed that the X-rays can be energetically dominant even at large distances from the core, and sparked renewed interest in jet physical properties. Canonical synchrotron or synchrotron self-Compton models fail to reproduce adequately the radio-to-X-ray spectral distribution of the jet, which instead is well explained by a model invoking inverse Compton scattering of the microwave background photons, provided that the emitting plasma is in bulk relativistic motion on kpc scales. Are inverse Compton jets associated with higher redshifts sources? and what are the implications for jet's physical properties – magnetic fields, beaming factors, radiative powers? To address these and other issues we are performing a systematic survey in the X-rays and optical of a well-designed sample of 17 radio jets, using Chandra and HST. Results for the first observed sources show a high detection rate of the jets with both Chandra and HST, with a variety of morphologies and spectra. In my talk, I will review recent Chandra observations of jets, focussing in particular on the results from our survey, and highlight future prospects.

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CATEGORY: ACTIVE GALAXIES AND QUASARS