X-RAY ASTRONOMY 2019
Current Challenges and New Frontiers in the Next Decade
8-13 September 2019
CNR/INAF Research Area, Bologna, Italy

Contribution ID: **243** Type: **Poster**

Radio morphology-accretion mode link in FRII low-excitation radio galaxies

Friday, 13 September 2019 18:00 (2 minutes)

Radio Galaxies (RG) are Radio-Loud Active Galactic Nuclei (AGN) characterized by powerful relativistic jets, oriented at relatively large inclination angles with respect to the observer's line of sight. They are extraordinarily relevant to address important issues such as the interaction between Super Massive Black Holes, the radio jets and their environment.
RGs are commonly classified on the basis of their radio morphology into low radio power FRI (core-dominated) and high radio power FRII (lobe-dominated). Almost all FRIIs hide an efficient accretion disk, while the central engine of FRIs is probably an ADAF, suggesting a strong link between ejection of relativistic plasma and accretion. However, there is a group of FRII sources
that does not fit into this picture. They exhibit powerful extended radio structures but inefficient accretion, as attested by their low excitation optical spectra.
In order to investigate their nature, an X-ray systematic analysis of all FRIIs belonging to the 3CR sample with $z < 0.3$ and available Chandra and XMM-Newton observations was performed. We investigate different scenarios and conclude that the evolutionary one is the most probable. FRII-LERGs have indeed intermediate properties (X-ray luminosity, column density and accretion rate in terms of Eddington luminosity) with respect to classical FRIIs and FRIs.
The nuclear power seems to suffer of a depletion of the cold gas reservoir. It is then plausible to think that this information has not yet reached the large-scales radio structures at kpc distances from the central engine. The powerful lobes are the heritage of a past AGN activity at higher efficiency.

Topic

Active Galactic Nuclei: accretion physics and evolution across cosmic time

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Session Classification: POSTER SESSION