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The jet-disc connection in gamma-ray-emitting narrow-line Seyfert 1 galaxies: the X-ray view

Before the launch of the Fermi satellite only two classes of AGN were known to generate relativistic jets and thus to emit up to the gamma-ray energy range: blazars and radio galaxies, both hosted in giant elliptical galaxies. The discovery by the Large Area Telescope on-board the Fermi satellite of variable gamma-ray emission from a few radio-loud narrow-line Seyfert 1 galaxies (NLSy1) revealed the presence of an emerging third class of AGN with relativistic jets. NLSy1 are usually hosted in late-type galaxies with relatively small black hole masses. This finding opened new challenging questions about the nature of these objects, the jet-disc connection, the emission mechanisms at high energies, and the formation of relativistic jets.

High quality spectra obtained by XMM-Newton are fundamental to determine if the X-ray spectrum of these sources is completely dominated by the jet emission or there is some contribution from the accretion flow, such as the soft X-ray excess and the Fe K line. NuSTAR observations provide a complementary coverage in the hard X-ray part of their spectrum.
In addition, thanks to the analysis of Swift and XMM-Newton data collected between 2008 August and 2019 March, we investigate the spectral and flux variability of gamma-ray-emitting NLSy1 on different time-scales and the connection with the gamma-ray emission observed by Fermi-LAT and the optical and UV emission observed by Swift-UVOT and XMM-OM. Moreover, the circum-nuclear environment of these NLSy1 could potentially provide a wealth of information on the radiative and mechanical feedback. Both feedback modes can be investigated through emission and absorption features arising in the X-ray spectrum. The high-resolution spectroscopic capability of XMM-Newton will be further exploited searching for such features in the spectra of gamma-ray-emitting NLSy1.

In this talk we discuss the results of the analysis of XMM-Newton, NuSTAR, and Swift data available for the nine gamma-ray-emitting NLSy1 detected by Fermi-LAT so far and we study the relation between accretion flow and jet, and the emission mechanisms at work in these NLSy1. Finally, the X-ray properties of the gamma-ray-emitting NLSy1 will be compared to what was observed in gamma-ray-emitting radio galaxies and blazars.

Topic

Active Galactic Nuclei: accretion physics and evolution across cosmic time

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