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Jet physics of gamma-ray-emitting narrow-line Seyfert 1 galaxies

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The discovery by the Large Area Telescope on-board the Fermi satellite of variable gamma-ray emission from radio-loud narrow-line Seyfert 1 galaxies (NLSy1) revealed the presence of an emerging third class of AGN with powerful relativistic jets. Considering that NLSy1 are usually hosted in late-type galaxies with relatively small BH masses, this finding opened new challenging questions about the nature, disc/jet connection, high-energy emission mechanisms and formation of powerful relativistic jets in these objects.

Multi-wavelength observational properties of gamma-ray-emitting NLSy1 are similar to those seen in blazars. The X-ray emission is one of the most intriguing aspects. The X-ray spectra of these sources are completely dominated by the jet emission above 2 keV, while good-quality X-ray spectra show below 2 keV a significant contribution from the accretion flow, such as the soft X-ray excess, making them different from typical blazars. There are also increasing evidence that gamma-ray-emitting NLSy1, unlike radio-quiet NLSy1, are hosted in elliptical galaxies. Moreover, estimates of the BH mass obtained with different techniques (accretion disc model fitting, optical spectro-polarimetry, IR bulge luminosity) are larger than the virial masses for the gamma-ray-emitting NLSy1. These results are confirming that a massive SMBH is a key ingredient for developing powerful relativistic jets and among the radio-loud NLSy1 only those hosted in massive elliptical galaxies are able to produce these structures.

In this talk, we show new results on radio-to-gamma-ray observational properties, jet collimation, host galaxy, BH mass estimation of gamma-ray-emitting NLSy1, and discuss jet physics and accretion process of these sources.

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