Inefficient accretion flow to produce high energy neutrinos from Blazars

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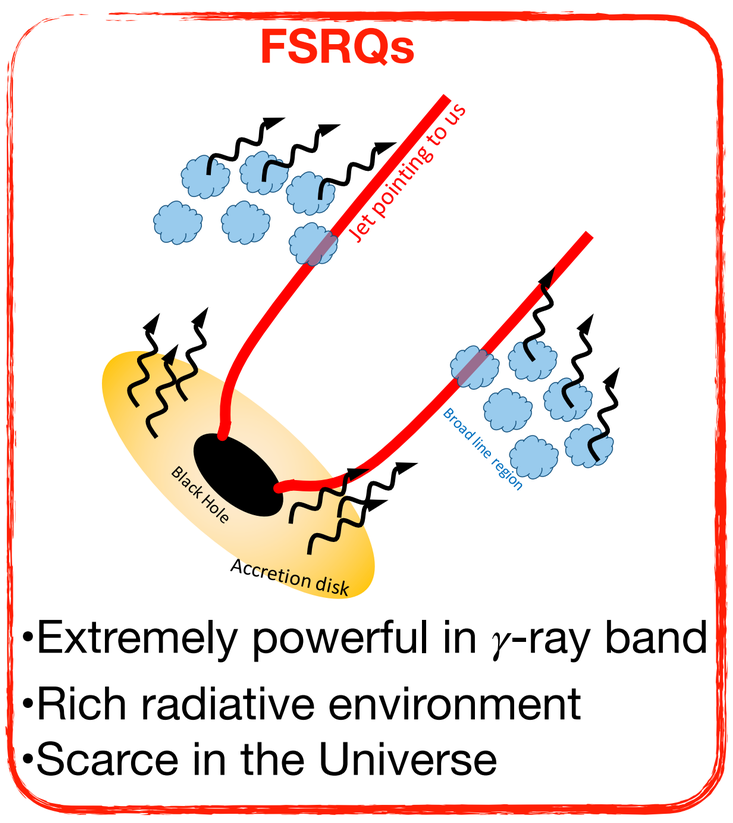
Context

The multimessenger observations of Blazar TXS0506+056 associated to a well reconstructed IceCube event, provide strong constraints to neutrino emission models.

What are Blazars

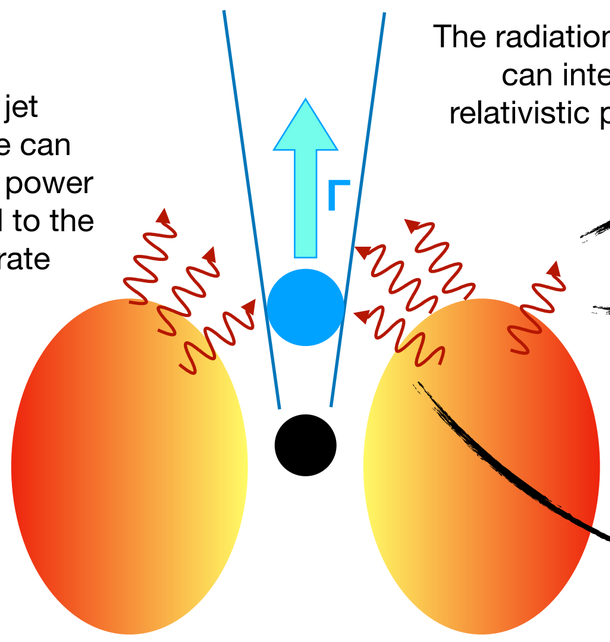
Blazar objects are a subclass of jetted Active Galactic Nuclei with the jet pointing to us. They are characterised by strong variability at all frequencies and by an intense emission in the γ-ray band. This makes Blazars the most energetic persistent extragalactic γ-ray sources. Blazars are divided in:



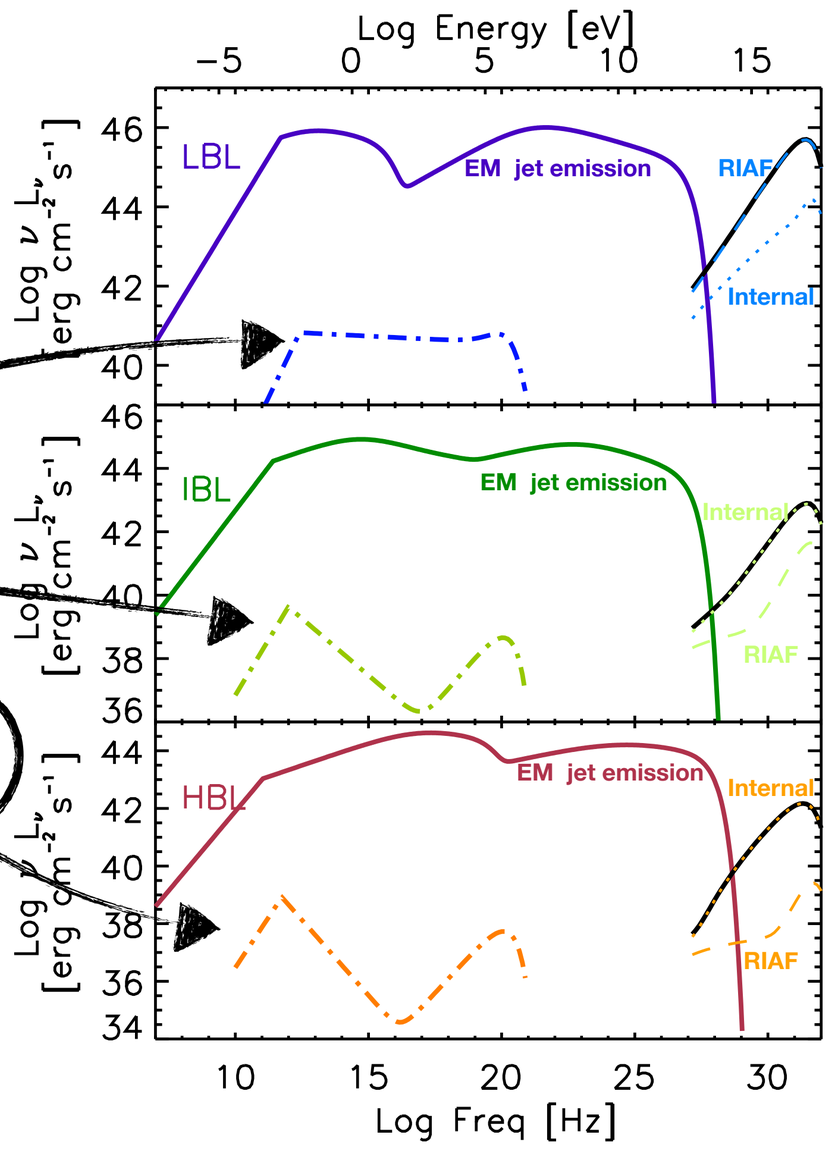
TXS 0506+056 seems to be a low-energy peaked BL Lac, but see [2]

For BL Lacs, *one zone models,* i.e. considering only the internal jet photons for the photo meson reaction, are challenged by the required large cosmic ray power. We consider the role of the *external radiation from the inefficient accretion flow* (RIAF) onto the central black hole [1]. We found that the radiation field of the RIAF is potentially dense enough to dominate the neutrino production through photomeson reactions in the case of low-energy peaked BL Lacs (LBL).

From the jet emission we can derive the jet power that is related to the accretion rate



The radiation emitted by RIAF can interact with the relativistic protons of the jet



Neutrino emission dominated by the contribution given by RIAF

Increasing jet power
Increasing accretion rate

The contribution of the RIAF is negligible and thus too low to allow efficient neutrino emission.

Work in progress:

Nature of TXS 0506+056: FSRQ or BL Lac, detailed description of the accretion flow (Righi et al. in prep)
A refined interpretation of the emission of the accretion flow in Blazars

References:

[1] Righi C., Tavecchio F., Inoue S., 2019, MNRAS, 483, L127
[2] Padovani P., Oikonomou F., Petropoulou M., Giommi P., Resconi E., 2019, MNRAS, 484, L104
[3] Yuan F., Narayan R., 2014, ARA&A, 52, 529 (review on hot accretion flow)