Contribution ID: **45**   Type: **not specified**

VLBI investigation of candidate neutrino emitters

Thursday, 30 November 2023 10:20 (20 minutes)

Theoretical models predict that the inner part of blazar jets is the site
in which particle acceleration takes place and high-energy neutrinos are produced. The high angular resolution observations with the very long baseline interferometer (VLBI) provide crucial tests for the association of neutrinos with blazars. The interest of the multi-messenger community in blazars as possible neutrino counterparts was powered up in 2017 when a high-energy neutrino was detected in close proximity with the blazar TXS 0506+056, which was also flaring in gamma-rays. The VLBI follow-up observations led to the unveiling of VLBI-scales properties in TXS 0506+056 jet potentially connected with the neutrino production. However, since then, the general picture of the origin of the high-energy neutrino and their possible association with gamma-ray blazars (and with their radio behaviours) have not been clarified yet. Moreover, different classes of objects have been proposed as possible neutrino emitters.
In this context, we aimed to add new pieces to this puzzling scenario with the VLBI investigation of a sample of gamma-ray blazars observed in spatial coincidence with four new neutrino events, detected by the IceCube neutrino observatory between 2019 and 2020. In the near future, the high sensitivity and the large FoV of the Square Kilometre Array (SKA) will allow us to scan the entire neutrino localisation regions, which are of the order of degrees squares, in order to identify all the possible radio counterparts, including low surface brightness and non-blazar sources. The VLBI follow-up observations will subsequently provide detailed VLBI-scales characterization of the SKA-detected candidates, which could lead to ascertaining their connection with the neutrino events and determining radio features in common in neutrino sources. I will present our VLBI results on the four VLBI follow-ups of the neutrino events obtained so far and how the VLBI-SKA synergy will help in the potential candidates identification.

Reasearch area

VLBI

Primary author: NANCI, Cristina (Istituto Nazionale di Astrofisica (INAF))

Presenter: NANCI, Cristina (Istituto Nazionale di Astrofisica (INAF))

Session Classification: Parallel - Galaxy Evolution & AGN