

Title

A MeerKAT long-term monitoring of the changing jets in GRS 1915+105

Abstract

The black hole X-ray binary GRS1915+105 (1915) was discovered as a new transient in 1992 and exhibited the first example of super-luminal jets within our Galaxy, extended on sub-arcsec scales and consistently launched at ~ 30 degrees from the N-S direction. In 2018, GRS 1915+105 entered an X-ray obscured phase, characterized by very dim X-ray emission accompanied by alternating radio-dim phases and intense flaring periods. Over the past five years, observations at variable angular resolutions failed to detect extended jets until August 2023, when newly resolved jets started to be detected.

Two types of jets are currently observed simultaneously: slow jets (subluminal), propagating at 8 and 25 degrees from N-S, and fast jets (superluminal) consistently launched at 30 degrees from the N-S on the plane of the sky.

We propose to monitor GRS 1915+105 with MeerKAT for one year, with 12 monthly observations at S-band, with the objective of detecting the jets for as long as possible to probe their evolution on long time scales, exploiting the MeerKAT sensitivity to low surface brightness structures, and the angular resolution of the S-band data.

Our main aim is to constrain the properties of the slow and fast jets launched in GRS 1915+105 and to confirm that in this system two jet launching mechanisms are at play, generating slow, processing jets, and fast fixed-direction jets. Our results will have far-reaching implications for jetted black holes at all scales.