

# MeerKAT radio observations of PSR B1259-63 during the 2024 periastron passage in a multi-wavelength context

## Abstract

Gamma-ray loud binaries (GRLBs) are a rare subclass of high-mass binary systems whose energy spectrum peaks in the GeV band and extends up to TeV energies. Currently, less than ten such systems are known, which makes them a relatively unexplored class of objects. All known GRLBs host an O/Be spectral type star and a compact object. The nature of the compact object is not certain for most of these systems. The wealth of the observed non-thermal emission from radio to TeV energies is believed to be due to the interaction of stellar/compact object outflows.

PSR B1259-63 is a 3.4-year period GRLB detected close to periastron at radio-to-TeV wavelengths. As of now, this is the only gamma-ray binary with a pulsar compact object, where regular multi-wavelength observations of both the pulsed and unpulsed emission are possible. This makes PSR B1259-63 a unique laboratory for studies of properties of the pulsar/stellar outflows and their interaction, as well as physical mechanisms that can produce very high energy emission.

With this proposal, we ask for 79 observations (33~h total duration) of PSR B1259-63 close to its periastron passage in 2024 with MeerKAT (L-band). These observations will allow us to: measure the distribution of clumps in the stellar wind; constrain the location of the X-ray and radio-emitting regions; understand the radio behaviour of the system during periods of strong GeV activity; study circular polarisation of pulsed radio emission. To reach these goals we also plan regular observations of this source at keV and GeV energies.