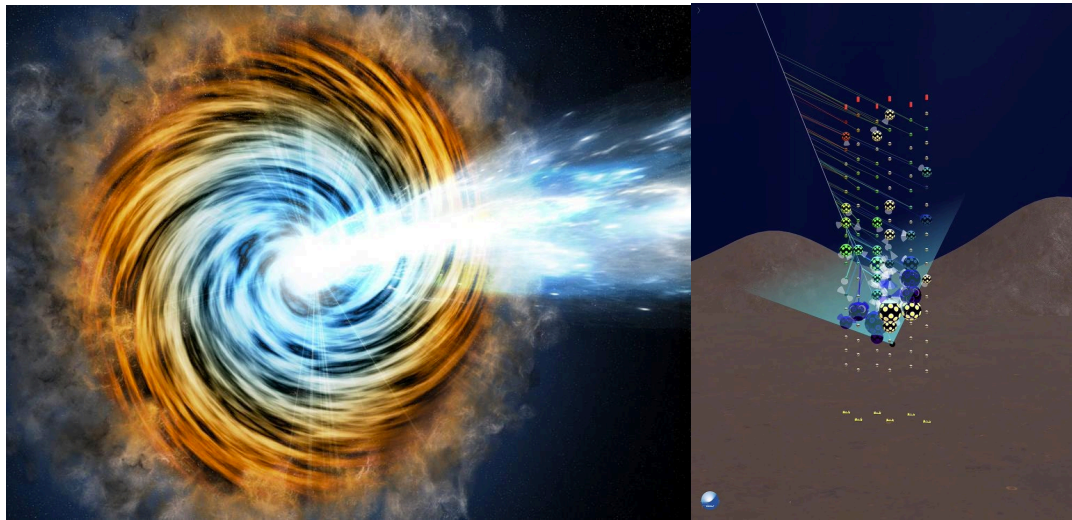

Neutrino astrophysics with ANTARES and KM3NeT

Supervisors:

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Description:

Neutrinos are almost massless subatomic particles. Produced in nuclear reactions and high-energy particle collisions, most of them pass through the entire Earth undetected. In particular, they are thought to be produced in supernovae, and in the jets of active galactic nuclei. However, so far, only one source of high-energy neutrinos, the blazar TXS 0505+056, has been tentatively identified.



Left: artist's impression of a blazar; right: display of a KM3NeT event.

The KM3NeT neutrino telescope (KM3NeT) is a cubic kilometre detector currently under construction deep underwater in the Mediterranean. It aims to detect neutrinos and study their properties in unprecedented detail. In order to take advantage of this sensitivity requires tuning search parameters to account for the latest astrophysical models. This project will:

- Analyse simulations of KM3NeT response to neutrino signals
- Study predictions for neutrino production, and adapt existing search techniques to optimise KM3NeT sensitivity
- Perform searches for neutrino sources with KM3NeT data, and historical data from its predecessor, ANTARES

Neutrinos hold the key to understanding the production of the highest-energy particles in the Universe, cosmic rays, and could point the way towards the dark matter particle or flaws in the Standard Model of Particle Physics.
