

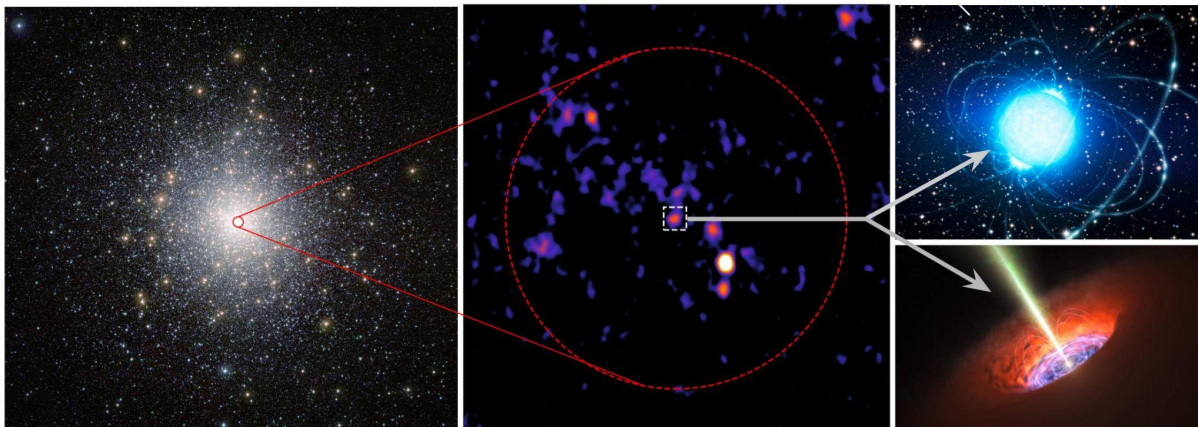
Hunting black holes and neutron stars in star clusters

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Description: Discovery of new black holes and neutron stars over the past decade with novel techniques has ushered in an exciting era in our understanding of formation and evolution of these elusive objects. Star clusters in our Galaxy are among the most promising places to find black holes and neutron stars. In this project, using novel observational techniques and astronomical surveys, we will be looking for new black holes and neutron stars in star clusters in our Galaxy. Finding new objects is important to determine how they form and evolve, and star clusters provide excellent laboratories for the formation of particularly interesting or exotic systems.

The project will use state-of-the-art techniques, both to better understand black holes and neutron stars, and to prepare us to leverage the upcoming generation of astronomical facilities such as the Square Kilometre array to gain new insights into formation and evolution of neutron stars and black holes in our Galaxy, particularly in star clusters. Globular clusters are exciting environments to explore exotic phenomena such as black holes and neutron stars. In this project our aims are to:

- Search for intermediate-mass black holes at the centres of star clusters, using deep multi-wavelength observations.
- Identify compact binary star systems in star clusters that could host black holes or neutron stars.
- Identify exotic pulsar systems in imaging data that are not accessible to beamformed searches.
- Characterize population of neutron stars and black holes in star clusters by comparing observations to theoretical models and simulations and considering selection functions.



Left: A globular cluster as seen in the optical band. Centre: A deep radio image of the core of this cluster, which revealed new radio sources. These sources are likely neutron stars or black holes (artistic depictions on the right). In this project, we aim to find and characterize elusive neutron stars and black holes in star clusters.