Proposal Abstract:

Binary pulsars are fascinating systems that have allowed for some of the most exciting astrophysical experiments, such as tests of gravity in the strong-field regime, probing the state of nuclear matter at ultra-high density. They are also the key to understand stellar evolution and supernova explosion mechanism. The Gaia satellite mission offers a unique opportunity to directly conduct targeted searches for binary pulsars. Here, we propose a survey for binary pulsars from a selection of sources identified in the most recent Gaia catalogue. The sources are selected based on an optimised candidate selection scheme using information of the optical and kinematic properties of known millisecond pulsars. The proposed observation will lead to the most conclusive search for pulsars from the selected sources, and is expected to yield a few new millisecond pulsar discoveries. The results will also be used to probe the fraction of neutron-star / white-dwarf binaries among double-degenerate objects and explore Type Ia explosion mechanism.