



THE CHINESE UNIVERSITY OF HONG KONG
Department of Physics
SEMINAR

Finding New Compact Binaries Using High-Precision Photometry

by

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ALL INTERESTED ARE WELCOME

Abstract

The mass and orbital distribution of existing black holes and neutron stars in binaries can have important implications on binary massive stellar evolution, shedding light on gravitational wave astronomy. However, the detected number of compact objects in binaries is orders of magnitude less than those predicted by population synthesis. This is because the search of compact objects in binary systems traditionally rely on non-thermal radiations, including radio, X-rays and gamma-rays, and thus is known to be biased against wide binaries, and possibly mass-gap black holes. Recent studies employing radial velocity searches and optical photometry have started to reveal new systems less probed before. In recent years, exoplanet-search satellites such as Transiting Exoplanet Survey Satellite (TESS) have opened an era of high-precision photometry of a large number of stars. I demonstrate that TESS photometric data do contain periodicity signals of known redback pulsar-like systems, by observing the orbital period-modulated flux variation from the stellar companion. We went on to identify a group of potential pulsar binaries within Fermi gamma-ray source locations. We have also made an estimate of searchable black hole binaries (~a few) in the field of Kepler. Identifying orbital period-modulated flux variation due to compact objects is a non-trivial task, and I will report our ongoing progress. Upcoming and planned exoplanet-search satellites such as PLATO, Roman, Earth 2.0 guarantee the discovery space in such a hunt for compact objects. In the end of my talk, I will introduce the CSST Big Bay Area Science Center and the upcoming funding opportunities.