SAN DIEGO STATE UNIVERSITY DEPARTMENT OF PHYSICS AND DEPARTMENT OF ASTRONOMY COLLOQUIUM

Speakers: Dr. Jeff Cooke (Swinburne University of Technology), and J. Chuck Horst (San Diego State University)

Topic: The Deeper, Wider, Faster program - Chasing the fastest bursts in the Universe

Time: 12:30 PM, Wednesday, September 21, 2016 (refreshments served at 12:15 PM)

Place: Room 215, Physics-Astronomy Building (PA-215)

Abstract:

Transient phenomena, such as supernovae and novae have been found to evolve over timescales of a few days to hundreds of days and span a large range of luminosities. However, a large number of transients are predicted to have durations of milliseconds-to-hours, such as fast radio bursts (FRBs), supernova shock breakouts, 'bursty' and 'dark' gamma-ray bursts, kilonovae, counterparts to gravitational waves, and other exotic events, with a few having serendipitous observations. This fast time domain has remained essentially unexplored largely a result of technological barriers.

We will discuss our innovative large Deeper, Wider, Faster (DWF) program that overcomes these obstacles by (1) coordinating simultaneous deep, wide-field, fast-cadenced multi-wavelength observations using major observatories - NASA Swift space telescope, CTIO DECam, the Antarctic AST3 telescope, Parkes, Molonglo, and the VLA, (2) performing real-time (seconds) supercomputer data processing and analysis, (3) implementing real-time transient identification using sophisticated visualisation technology and user-friendly web-based interface, and (4) obtaining very rapid 'flash' spectroscopy on the Gemini telescope (and potentially the VLT) and deep follow-up spectroscopy on Keck, SALT and the AAT telescopes. Finally, DWF secures detections by coordinating a network of telescopes, such as the SkyMapper, Zadko, ATCA, ESO REM, and MLO telescopes to perform simultaneous, interleaved, and later-time observations. One goal of DWF is to resolve the nature of FRBs "in one shot" by acquiring simultaneous, pre-, during, and post-event densely-sampled multi-wavelength light curves, by enabling source localization, and by obtaining minutes-later deep spectroscopy of the event itself and/or its host galaxy. DWF is the first program to explore the millisecond-to-hours time domain and aims to understand the physics and diverse explosion mechanisms behind such rapid and luminous events and uncover new and unexpected phenomena.