

SCHOOL OF PHYSICS

UNIVERSITY OF NEW SOUTH WALES



COLLOQUIUM

4-5 p.m., Tuesday, 2 June 2009

School of Physics Common Room

Room 64, Old Main Building

Professor James M. Jackson

Astronomy Department, Boston University, USA

“Snakes in the Plane: High-mass Star Formation in Filamentary Infrared Dark Clouds”

Infrared Dark Clouds (IRDCs) are cold, dense molecular clumps with enormous column densities. They are identified as dark extinction features in the mid-infrared. IRDCs contain compact cores which probably host the early stages of high-mass star formation. Many of these IRDC cores show active signs of star formation, such as enhanced 4.5 μm emission (a shock indicator), embedded 24 μm point sources, and 'hot core' chemistry. Most IRDC cores however, are quiescent, and show no detectable signs of star formation. We hypothesize that the 'quiescent' cores represent the earliest 'pre-stellar' core phase, before the development of a warm protostar, and that the 'active' cores represent a later 'hot core' phase, after the development of a protostar. We test this idea by comparing the sizes, densities, and maser activity between the 'active' and 'quiescent' cores, and find that the data confirm the hypothesis. Furthermore, as expected, IRDCs are located preferentially in a Milky Way spiral arm, the Crux-Scutum arm. One intriguing new clue about high-mass star formation is the extremely filamentary nature of IRDCs, some of which have aspect ratios of over 100 to 1. It is possible that all high-mass stars are formed in highly filamentary IRDCs due to the "sausage" fluid instability. If true, there are important consequences for theories of high-mass star formation.

The audience is invited to meet the speaker beforehand at 3.45 p.m. over coffee and biscuits in the Common Room.

Dr. Adam Micolich

Ph.: (02) 9385-6132

e-mail: mico@phys.unsw.edu.au