Western University
Department of Physics and Astronomy

PHYSICS & ASTRONOMY COLLOQUIUM

Date: Thursday, 16th February 2017
Time: 1:30 p.m.
Location: Physics & Astronomy Seminar Room 100

Dr. Michael R. Meyer
Department of Astronomy
University of Michigan

"Empirical Constraints on Theories of Planet Formation:
Capitalizing on Diversity"

ABSTRACT

Planetary bodies provide suitable environments for the emergence of life. Thus knowing their
distribution as a function of mass, orbital radius, and bulk composition can help constrain the
possible number of habitable worlds. Observations in the accessible regions of our Galaxy provide
empirical constraints on planet populations. Yet extrapolation of these results to the rest of the
observable Universe requires understanding the dependence of formation and evolution on a wide
range of initial conditions. On the one hand, this process is simple: small bodies grow into larger
ones through collisions (and sticking) of solid particles, or through local gravitational instabilities.
On the other hand, the specific outcomes depend on a large number of complex properties
requiring coupled understanding of dynamics, chemistry, and radiative transfer over several orders
of magnitude in solid particle size, gas density and orbital radius. I will first introduce some basic
concepts of planet formation, with a focus on how they might depend on stellar mass. Then I will
review current observational results (RV, micro-lensing, and direct imaging) that constrain these
theories and outline a framework to quantify our ignorance. Finally, I will propose experiments
(some underway with new IR instrumentation on 8-meter class telescopes, and others planned for
future facilities) that aim to efficiently improve our understanding. One exciting prospect is to
determine peak in the surface density distribution of gas giants (and the minimum of the
companion mass ratio distribution) as a function of stellar mass suggesting current theories to a
very stringent test.

COFFEE + light snacks will be available in the Atrium, 2nd floor, at 1:15 p.m.