Western University
Department of Physics and Astronomy

PHYSICS & ASTRONOMY COLLOQUIUM

Date: **Thursday, 2nd November 2017**
Time: **1:30 p.m.**
Location: **Physics & Astronomy Seminar Room 100**

Dr. Michael R. Meyer
Department of Astronomy
The 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 subjecting current theories to a very stringent test.

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