You are cordially invited to attend the following seminar sponsored by the Department of Mechanical Engineering:

Friday, October 13, 2006
114 Spencer Lab, 12:15 – 1:15 P.M.

Dr. Raymond Shaw
Michigan Technological University

"SCALE-DEPENDENT DROPLET CLUSTERING IN TURBULENT CLOUDS"

Abstract:

A casual glance at the sky on a partly cloudy day confirms that clouds are turbulent: they are patchy due to their active mixing, continuously engulfing clear air in some places, and evaporating in other places, almost always in complex, seemingly random patterns. Perhaps surprisingly, however, most theoretical and computational treatments of rain formation due to collisions between cloud droplets rest on the assumption that these particles move in quiescent air, and that they are distributed in a perfectly random manner (at least at "sub-grid" scales). Are these assumptions valid and when they are not, are the deviations something we should worry about? In order to understand the role of turbulence in cloud processes such as droplet coalescence we have carried out a series of experiments in laboratory and atmospheric turbulence. For example, results from flights in cumulus clouds and from controlled tests in an active-grid wind tunnel reveal scale-dependent and drop-size-dependent clustering, in general agreement with theoretical expectations for "inertial clustering." Processes such as inertial droplet clustering provide a direct link between cloud turbulence properties and the rate of rain formation, forcing us to rethink the manner in which these processes are treated in theories and models.

Refreshments will be served