1116-60-1832 **Timothy Chumley*** (tchumley@iastate.edu), **Scott Cook** and **Renato Feres**. *Random billiards and a thermally active Brownian particle.*

In this talk we present a model for the motion of a rigid body, whose boundary has a constant, non-uniform temperature distribution, as it interacts with a countable collection of point particles. The interaction mechanism is described by a Markov process which depends on the rigid-body-to-point-particle mass ratio as well as the temperature profile of the rigid body. Our main result is a diffusion approximation for the random process that describes the velocity of the rigid body. In particular, we make explicit the dependence of the coefficients of the approximating Ito process on certain microscopic features of the system such as mass ratio, temperature profile, and the parameters of the Poisson random measure that characterize the collection of point particles. Part of the aforementioned work is geometric in nature, dealing with the motion and collisions of rigid bodies in arbitrary dimensions, which requires the study of processes on Lie groups. If time permits, we describe a differential geometric elaboration of the model which arises by introducing mechanical constraints, holonomic and non-holonomic, on the motion of the rigid body. (Received September 21, 2015)