1125-37-2944 **Scott Cook*** (scook@tarleton.edu), Tarleton State University, Dept of Mathematics, Box-0470, Stephenville, TX 76402. *Thermodynamics and Thermophoresis in Random Billiard Dynamical Systems.*

We discuss a class of random billiard dynamical systems as a framework to study thermodynamics and diffusion of gas particles interacting with a rough surface. We first introduce a notion of temperature via perturbation of the usual billiard reflection law. This allows for heat reservoirs and the study of thermodynamical properties like heat flow and entropy production. Though we begin with single particle systems in one and two dimensions, we will focus on three dimensional systems with many interacting particles. We will distinguish one "Brownian" particle whose motion we wish to control using thermal gradients. This serves as a mathematical model of the process called thermophoresis in chemical engineering applications where an airborne "pollutant" (aerosol) is driven toward a target site by a temperature differential. If time permits, we will discuss techniques for simulating such systems using parallel algorithms on a GPU. (Received September 20, 2016)