1023-E5-50 **Mason A Porter*** (mason@caltech.edu), Caltech, MC 114-36, 120 Sloan Annex, Pasadena, CA 91125-3600. *Billiards with Mixed Regular and Chaotic Dynamics.*

Studies of the mathematical idealization of billiards, which consists of a confined point particle colliding elastically against the boundaries of a container of some shape, have led to numerous discoveries in dynamical systems and ergodic theory. These model Hamiltonian systems have also been probed in laboratory settings that allow very precise control over their boundary shape.

The best-studied billiards are either fully chaotic or integrable, but generic Hamiltonian systems are mixed, consisting of islands of integrability floating within a chaotic sea. In 2001, Leonid Bunimovich introduced a class of billiard containers shaped like idealized mushrooms, providing a class of examples with mixed regular-chaotic dynamics whose relatively simple geometry makes precise analysis feasible. This discovery has thus made it possible to address some delicate questions about the dynamics of systems with coexisting islands and chaotic regions. In this talk, I take an expository tour through some properties of mushroom billiards that Steven Lansel and I discussed in our March 2006 article in *Notices of the American Mathematical Society.* (Received July 15, 2006)