NSTD The Nuclear Science and Technology Division

SEMINAR ANNOUNCEMENT

TITLE: **A Sequential Implicit Monte Carlo Method**

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DATE: **Thursday, March 13, 2008**

TIME: **1:00 PM**

LOCATION: **Bldg. 5700, Room O304**

The Sequential Monte Carlo (SMC) method appeared in the literature in 1962 (Halton, *Proc. Camb. Phil. Soc*., **58**) as a technique for accelerating the convergence of stochastic simulations of discrete linear systems. By estimating a series of additive corrections to an initial estimate of the solution, a process essentially equivalent to iterative refinement, Halton showed that one can obtain unbiased estimates with a geometric rate of convergence (as opposed to the one-over-root-N rate dictated by the Central Limit Theorem). The SMC method was adapted to continuous-domain transport problems in the mid-to-late 1990s. The first generation of SMC transport methods employed functional expansions of the emission density to achieve geometric convergence to machine precision in idealized (i.e., 1-D, one-speed) neutron transport problems. However, the continuous functional expansion idea becomes intractable in multi-dimensional (not to mention multi-material) problems due to the geometric growth in the number of expansion coefficients that must be estimated. A new generation of SMC transport methods is based on employing a simple representation of the solution on a phase-space grid that is adaptively refined to achieve the desired convergence. This talk will discuss the development of a new sequential Implicit Monte Carlo method (for time-dependent simulations of non-linear thermal radiation transport problems) that borrows ideas from this new class of SMC transport methods.