Abstract: Many physical systems can be described as a stochastic process of independent marginal distributions subject to a global condition. The global conditioning breaks the independence between components, and much work has been dedicated to quantifying various aspects of the conditional joint distribution as well as the underlying structure which is being modeled. Examples include contingency tables, Sudoku matrices, latin squares, set partitions, trees. Standard approaches to sampling these structures include rejection sampling, Markov chains, importance sampling, as well as ad hoc approaches.

In this talk, we will discuss a general method for exact sampling called probabilistic divide-and-conquer (PDC). One particular application, “PDC deterministic second half,” provides an immediate improvement to exact Boltzmann samplers; another application, “self-similar PDC,” requires more detailed knowledge of the underlying structure, and has been utilized to obtain asymptotically efficient sampling algorithms. Other variations are similar to Latin hypercube sampling, where the sample space is decomposed into disjoint pieces and sampled separately.

Bio: Stephen DeSalvo is a Program in Computing Assistant Adjunct Professor in the UCLA mathematics department. His primary research areas are exact sampling algorithms, combinatorial stochastic processes, and Poisson approximation. He also has a strong computing background, which includes numerous projects related to biological systems and gambling.