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## **Non-Boltzmann Ensembles and Monte Carlo Simulation**

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Conventional Markov Chain Monte Carlo methods based on Metropolis type algorithms are useful for calculating averages of mechanical properties like energy. Thermal quantities like entropy and free energies are not accessible to these methods. There is a need to go beyond Metropolis algorithm. Such a need has been recognized as early as mid seventies of the last century. Torrie and Valleau proposed Umbrella Sampling. This technique has since undergone metamorphosis and we have multi-canonical Monte Carlo methods, entropic sampling, flat histogram Monte Carlo sampling, the algorithm of Wang and Landau etc. In this talk I shall review non-Boltzmann Monte Carlo methods with emphasis on recent developments.