Spin Chain QMC simulations of Mesoscopic Quantum Impurity Models JAEBEOM YOO, SHAILESH CHANDRASEKHARAN, RIBHU K. KAUL, DENIS ULLMO, HAROLD U. BARANGER, Duke University — Recent studies of quantum impurity problems have emphasized the need for flexible quantum impurity solvers. One such study focuses on mesoscopic fluctuations in the Kondo effect in quantum dots(cond-mat/0409211). Here we demonstrate that the mapping of single-quantum impurity problems to quantum spin-chains can be exploited to yield a powerful cluster algorithm that can treat the mesoscopic fluctuations exactly while at the same time being able to approach the large D_{eff}/T limit with ease. The algorithm is implemented explicitly for the Anderson and Kondo Hamiltonians, and compared with standard methods for the "mesoscopic Kondo problem." Using our algorithm we study mesoscopic fluctuations of the Kondo temperature in integrable and chaotic systems of various geometries.

Jaebeom Yoo
Duke University