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Abstract for an Invited Paper  
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**Timescales for equilibration and adiabaticity in optical lattices<sup>1</sup>**

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What are the timescales governing local and global dynamics in strongly correlated systems? How do we probe this dynamics in an isolated quantum system without coupling the system to leads? High in-situ resolved experiments on bosons in optical lattices are answering precisely these questions by imaging the gas following a sudden change of the lattice potential. The results are striking. Experiments have revealed a disparity as large as two orders of magnitude between fast equilibration of local number fluctuations and slow global mass redistribution. In this talk, I will provide a simple model which captures all the relevant physics. Additionally, I will show that the fast timescales for local dynamics challenge the accepted notions of adiabaticity times, invalidating routinely used techniques such as band-mapping as useful probes of quantum many body systems. References: S. S. Natu, K. R. A. Hazzard and E. J. Mueller, Phys. Rev. Lett. 106 125301 (2011).

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