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Abstract for an Invited Paper
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Properties of dirty bosons in disordered optical lattices

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Disorder is ubiquitous in nature and its presence can lead to fascinating phenomena such as Anderson localization, Griffiths mechanisms and glassiness. These types of behavior have profound consequences on low temperature ordered phases that are difficult to study, particularly due to lack of controllable disorder. Recent advances in ultra-cold atomic systems have made it possible to make significant progress in overcoming such challenges – making direct comparisons with large scale Quantum Monte-Carlo techniques a possibility. I will talk about the disordered Bose-Hubbard model and the equilibrium properties of the domains that arise in trapped systems. I will show how they correspond to phases and explore the consequences of finite temperature and strong correlations. These aspects will be used to explain the observations of experimental measurements. In particular, I will highlight results of a recent collaborative enterprise that show excellent agreement between theory and experiment.