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**Exploring many-body localization in two dimensions**

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The question of thermalization in closed quantum systems is currently a topic of intense research and ultracold atoms are an ideal experimental system for its study. In this context it is particularly interesting to study systems that do not thermalize. Many-body localized systems form a generic class of such systems, which is largely unexplored in higher dimensions and at high energy densities. Here we report on experiments with single site resolved ultracold lattice bosons in two dimensions subject to random disorder. Our data indicates a transition from thermalizing behavior at low disorder to localization at higher disorder and a diverging length scale at the transition. We also discuss recent experimental progress on the local characterization of disordered lattice bosons at low energy density.