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From spin-charge separation to magnetic polarons in Hubbard systems

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The Hubbard model offers an intriguing playground to explore strongly correlated many-body systems. Much of its complexity arises from the interplay of spin and charge degrees of freedom. Here we report on the experimental study of one- and two-dimensional synthetic Hubbard systems implemented on the optical lattice platform. We discuss our recent observations of spin-charge separation in one dimension and the imaging of magnetic polarons in two dimensions. Due to our spin and charge resolved imaging technique, our measurements are largely independent of presumed models. Future extensions of these experiments may allow one to study the interaction of polarons as a precursor to collective many body physics in the Hubbard model.