I will discuss recent progress of the optical lattice emulators of the Fermi Hubbard model. The new feature of these experiments is availability of snapshots of many-body states with single particle resolution. I will review new insights from these experiments on the properties of doped Mott insulators, including demonstration of magnetically mediated pairing. I will also present the idea of using quantum simulators to perform inference of NMR spectra for biological molecules. I will review recent experimental realization of this algorithm on a quantum computer using trapped ions. Prospects for scaling this approach to solving practically relevant problems will be discussed.

Host: Jean-Philippe Brantut, jean-philippe.brantut@epfl.ch