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From the First Atomic Fermi Gas to a Bad Metal¹

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One of the most exciting frontiers in physics is ultracold quantum gases. They play a role in unraveling the physics of superfluids, exotic solids, and nuclear and quark matter. Like all particles, quantum gases come in two flavors: bosons and fermions. In this talk, I will briefly tell a few stories related to how Deborah Jin and I realized the first Fermi gas of atoms in 1999, including how we created the first enriched potassium sources, measured the ⁴⁰K elastic collision cross-section, and a developed methods for detecting quantum degeneracy. I will describe how the legacy of this work is carried on by my group at Illinois in experiments on strongly correlated ⁴⁰K lattice gases. I will discuss recent measurements of mass-current decay, the detection of incoherent transport, and the observation of a surprising decrease in the transport lifetime at higher temperatures. The connection between this discovery and T-linear resistivity in bad metals will be described.

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