The flat rotation curves of spiral galaxies provided clear evidence for mass discrepancies in galactic systems, but the nature of dark matter (DM) still remains elusive. I will describe recent results from the Spitzer Photometry and Accurate Rotation Curves (SPARC) dataset: the largest collection of HI rotation curves currently available for late-type galaxies (spirals and irregulars). New Spitzer photometry at 3.6 um provides the closest proxy to the stellar mass, allowing precise estimates of the baryonic gravitational field at every radius ($g_{\text{bar}}$). We find that the observed acceleration correlates with $g_{\text{bar}}$ over 4 dex, implying a close link between baryons and DM in galaxies. This radial acceleration relation coincides with unity (no DM) at high $g_{\text{bar}}$ but systematically deviates below a critical acceleration scale. The observed scatter is remarkably small, even when DM dominates at low $g_{\text{bar}}$. Early-type galaxies (ellipticals, lenticulars, and dwarf spheroidals) follow the same relation as late-type galaxies. The radial acceleration relation is tantamount to a “Kepler Law” for galactic systems: when the baryonic contribution is measured, the rotation curve follows, and vice versa. I will discuss possible interpretations within the standard LCDM cosmology as well as alternative theories.

Bio: My research interests revolve around the structure, dynamics, and evolution of galaxies. Specifically, I study galaxies in the nearby Universe, where one has access to the full range of galaxy types (from giants to dwarfs) and can investigate their internal properties in exquisite detail.