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### **Wrangling the Beast Precision Supermassive Black Hole Mass Measurement With ALMA<sup>1</sup>**

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While supermassive black holes (BHs) gravitationally dominate only the innermost regions of galaxies, their masses correlate with large-scale galaxy properties, hinting that BHs co-evolve with their host galaxies over the age of the universe. These correlations suggest a distinct evolutionary pathway for the most luminous galaxies; however, an incomplete census of  $\sim 10^9$  solar mass BHs (and large measurement uncertainties) prevent any definitive conclusions. While still useful in mapping out the circumnuclear region of these massive galaxies, I will demonstrate that warm molecular and ionized gas tracers tend to be turbulent probes. Emission-line observations with the Atacama Large Millimeter/submillimeter Array (ALMA) are opening a new avenue for studying BH demographics in nearby galaxies. I will present ongoing ALMA CO imaging that has resolved circularly-rotating molecular gas disks in the nuclei of a growing number of very luminous galaxies, providing ideal probes of their inner gravitational potentials. I will highlight results from recent gas-dynamical modeling efforts, which have enabled some of the most precise direct BH mass determinations to date and important cross-checks with other measurement techniques. I will also discuss the prospect of future telescopes like the next-generation Very Large Array (ngVLA) to expand on ALMA's revolutionary capabilities.

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