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Precision spectroscopy of ultracold Sr₂ molecules in an optical lattice GEOFFREY IWATA, MICKEY MCDONALD, BART MCGUYER, TANYA ZELEVINSKY, Columbia University — Trapped, ultracold ⁸⁸Sr₂ continues to be a versatile tool to probe quantum molecular dynamics and study fundamental interactions. Here we overview recent precision experiments carried out in an optical lattice that build on previous work, including measurements of Coriolis mixing of molecular states via anomalous Zeeman shifts, magnetic-field enabled electric-dipole transitions with $\Delta J > 1$, and the observation of doubly forbidden M1 and E2 transitions. Exploiting the tensor lattice light shift, we engineer molecular magic wavelengths and magnetic sublevel mixing for precision spectroscopy. These studies provide a basis to test and develop *ab initio* models for molecular quantum chemistry and many-body physics. Progress towards production of deeply bound ground-state ⁸⁸Sr₂ is described.

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