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Non-Perturbative Calculation and Measurement of Strong Light Shifts with Floquet Theory SIMON COOP, SILVANA PALACIOS, PAU GOMEZ, MORGAN W. MITCHELL, ICFO-The Institute of Photonic Sciences — We describe a new theory for calculating atomic light shifts (ac Stark shifts) using Floquet's theorem, and we present spectroscopic data verifying our calculations. The theory remains accurate in the presence of strong level-mixing where the shifts are larger than the hyperfine splitting, and can quantitatively describe shifts due to multiple wavelengths with arbitrary polarization. As the theory can be used to accurately predict large nonlinear shifts, it could be useful for measuring electric-dipole matrix elements. This has implications for optical clocks, tests of atomic structure calculations, and fundamental atomic physics. This theory could also be useful for site-dependent state preparation in quantum simulators, and general experiment design and characterization.

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