

Optical techniques for Rydberg physics in lattice geometries

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We address the technical challenges when performing quantum information experiments with ultracold Rydberg atoms in lattice geometries. We discuss the following key aspects: (i) the coherent manipulation of atomic ground states, (ii) the coherent excitation of Rydberg states, and (iii) spatial addressing of individual lattice sites. We briefly review methods and solutions which have been successfully implemented, and give examples based on our experimental apparatus. This includes an optical phase-locked loop, an intensity and frequency stabilization setup for lasers, and a nematic liquid-crystal spatial light modulator.

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