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Atom-surface studies with Rb Rydberg atoms YUANXI CHAO, JITENG SHENG, JONATHON SEDLACEK, JAMES SHAFFER, Univ of Oklahoma — We report on experimental and theoretical progress studying atom-surface interactions using rubidium Rydberg atoms. Rydberg atoms can be strongly coupled to surface phonon polariton (SPhP) modes of a dielectric material. The coherent interaction between Rydberg atoms and SPhPs has potential applications for quantum hybrid devices. Calculations of TM-mode SPhPs on engineered surfaces of periodically poled lithium niobate (PPLN) and lithium tantalate (PPLT) for different periodic domains and surface orientations, as well as natural materials such as quartz, are presented. Our SPhP calculations account for the semi-infinite anisotropic nature of the materials. In addition to theoretical calculations, we show experimental results of measurements of adsorbate fields and coupling of Rydberg atoms to SPhPs on quartz.

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