

Abstract Submitted
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Microwave quantum logic spectroscopy and control of molecular ions MOLU SHI, PETER HERSKIND, MIT, MICHAEL DREWSEN, Aarhus University, ISAAC CHUANG, MIT — A general method for rotational microwave spectroscopy and control of polar molecular ions via direct microwave addressing is considered. Our method makes use of spatially varying ac Stark shifts, induced by far off-resonant, focused laser beams to achieve an effective coupling between the rotational state of a molecular ion and the electronic state of an atomic ion. In this setting, the atomic ion is used for read-out of the molecular ion state, in a manner analogous to quantum logic spectroscopy based on Raman transitions. In addition to high-precision spectroscopy, this setting allows for rotational ground state cooling, and can be considered as a candidate for the quantum information processing with polar molecular ions. All elements of our proposal can be realized with currently available technology.

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