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Electric field sensing near the surface microstructure of an atom chip using cold Rydberg atoms[1]

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Rydberg atoms may enable hybrid systems that combine the benefits of gas-phase atoms with those of solid-state devices. However, these hybrid systems will require atoms to be located near a heterogeneous surface with exposed metal electrodes and dielectric insulators, which are sources of uncontrollable and unwanted electric fields. With this motivation, we have measured the electric fields near the heterogeneous metal-dielectric surface of an atom chip using cold Rydberg atoms [1]. We have also developed a technique for reducing the influence of dc and low-frequency electric fields on Rydberg atom transitions, while retaining their sensitivity to high-frequency resonant fields [2].

[1] J. D. Carter, O. Cherry, and J. D. D. Martin, Phys. Rev. A, v. 86, 053401 (2012).
[2] *Rydberg atoms with a reduced sensitivity to dc and low-frequency electric fields*, L. A. Jones, J. D. Carter, J. D. D. Martin, arXiv/1301.4170.

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