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Quantum Phase Transition between (Luttinger) Liquid and Gas of Cold Molecules[1] DIMA FELDMAN, KAM TUEN LAW, Brown University — We consider cold polar molecules confined in a helical optical lattice similar to those used in holographic microfabrication. An external electric field polarizes molecules along the axis of the helix. The large-distance inter-molecular dipolar interaction is attractive but the short-scale interaction is repulsive due to geometric constraints and thus prevents collapse. The interaction strength depends on the electric field. We show that a zero-temperature liquid-gas transition occurs at a critical field. It can be observed under experimentally accessible conditions.

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Dima Feldman
Brown University

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