

Abstract Submitted  
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**Exciton-like molecules and interaction resonances in bilayer ultracold gases**<sup>1</sup> MARTON KANASZ-NAGY, EUGENE DEMLER, Harvard University, GERGELY ZARAND, Budapest University of Technology and Economics — I will discuss how confinement effects in bilayer quantum gases can lead to interlayer molecular states, that appear both at positive and negative energies and even at layer separations many times larger than the interspecies scattering length. Similar to excitons in bilayer quantum wells, the lifetime of the molecules grows significantly with increasing layer separation, allowing for their detection in simple shaking experiments. Moreover, these molecular states also give rise to sharp interspecies Feshbach resonances, enabling one to control the interaction between the two species geometrically, simply by changing the layer separation. Rather counter-intuitively, the species can be made strongly interacting, by separating them from each other. [M. Kanasz-Nagy, E. A. Demler, and G. Zarand, Phys. Rev. A 91, 032704 (2015)]

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