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Impurity induced bound states and proximity effect in a bilayer exciton condensate YONATAN DUBI, ALEXANDER V. BALATSKY, Los Alamos National Laboratory — The effect of impurities which induce local interlayer tunneling in bilayer exciton condensates is discussed. We show that a localized single fermion bound state emerges inside the gap regardless of the strength of impurity scattering. We calculate the dependence of the impurity state energy and wave function. We show that such an impurity induced single fermion state enhances the interlayer coherence around it, and is similar to the superconducting proximity effect. As a direct consequence, we predict that a finite concentration of such impurities will increase the critical temperature for exciton condensation.

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