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**BEC-BCS crossover of a dipolariton condensate in a semiconductor microcavity** JUNG-JUNG SU, E. L. Ginzton Lab., Stanford Univ.; Dept. of Electrophys. Natl. Chiao Tung Univ., Taiwan, NA YOUNG KIM, E. L. Ginzton Lab., Stanford Univ, YOSHIHISA YAMAMOTO, E. L. Ginzton Lab., Stanford Univ; Natl. Inst. of Informatics, Japan, ALLAN H. MACDONALD, Dept. of Phys., Univ. of Texas at Austin — We study the electron-tunnel-coupling condensation of dipolar exciton-polariton (dipolariton) at the BEC-BCS crossover. An exciton-polariton (EP) is an extremely light bosonic quasiparticle composed of excitons and photons and can condense a temperatures as high as room temperature. Electron tunneling between nearby quantum wells can coupled spatially direct and indirect excitons and therefore also the corresponding exciton-polaritons; the indirect EPs in particular carry the interesting dipolar nature. We use a fermionic mean-field theory to examine the influence of this coupling on EP condensates from the dilute BEC to the dense BCS limits. A wide variety of distinct states are found, including mixed direct and indirect EP condensates, and metallic condensates, depending on particle-densities and on the relative positions of the quantum well states in different wells. Possible experimental manifestations of these phenomena will be discussed.

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