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Session V15: 2D Materials (Semiconductors) -- Emerging Materials II
2:30 PM–5:30 PM, Thursday, March 7, 2019
BCEC Room: 154

Sponsoring Unit: DMP
Chair: Brian Kiraly, Radboud University

Abstract: V15.00012 : Study of dipolar excitons in TiS_3 double layer*

5:06 PM–5:18 PM

← *Abstract* →

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The most studied layered semiconductors to date are the transition metal dichalcogenides and nowadays there is a flurry of effort to study the transition metal trichalcogenides (TMTC) with MX_3 composition (M is a metal X is a chalcogen) that have highly anisotropic crystal structure. We present the results of study of the formation of dipolar excitons in a TMTC double layer in the framework of a Wannier-Mott model for the indirect excitons that takes into account the anisotropic effective masses. The energy spectrum and wave functions for a single dipolar exciton are obtained and binding energies are calculated within the harmonic oscillator approximation for the Rutova-Keldysh and Coulomb potentials. In the framework of the Bogoliubov approximation spectrum of collective excitations for the dilute weakly interacting Bose gas of dipolar excitons si studied and the mean field critical temperature for the superfluidity is obtained. It is demonstrated that as a result of the strong in-plane anisotropy, superfluidity is vastly differ in different crystalline directions. The calculations are performed for a direct band gap semiconductor TiS_3 that is a prototypical representative of TMTC materials.

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