Excitons in 2D monolayer TMD

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Last 30-40 years, scientists have been searching for environmentally clean, efficient, effective, renewable and sustainable energy source. One of the sustainable energy is harnessing Sun energy silicon "biscuit", organic polymer and quantum dot solar sails. Quantum dots have the remarkable properties - they can generate multiple electron-hole systems using one absorption photon and the varying size of the quantum dots we can use the Sun's radiation from visible to infrared wavelength. Very important point of view of the efficiency used atomically two dimensional (2D) thin quantum dot materials such graphene and transition metal dichalcogenides (TMDs). For the 2D monolayer TMDs there is an enhancement of the coulomb interaction. This causing formation of bound electron-hole pairs and we can manipulate the optical and charge-transport property and can facilitate the application of these as a solar sail.

In this project theoretically investigated the ground and excite state properties of excitons in 2D monolayer TMD. In details we have solved the 2D Schrödinger equation for screening Coulomb potentials. All calculations are done by using software Wolfram, MATHEMATICA.