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Trion formation in monolayer transition metal dichalcogenides
ROMAN YA. KEZERASHVILI, New York City College of Technology, City University of New York, SHALVA M. TSIKLAURI, Borough of Manhattan Community College, The City University of New York — We present three-body calculations for trions binding energy in monolayer transition metal dichalcogenides using the method of hyperspherical harmonics (HH). In numerical calculations for a proper treatment of Coulomb screening in two dimensions we assume that electrons and holes are interacted via Keldysh potential [1]. The convergences of binding energy calculations for the ground state of the trion as a function of the grand angular momentum are studied. For the trion binding energy in MoS_2 we obtain 19.2 mev. This value is remarkably close to the experimental one of 18 meV. A comparison with results of other calculations are presented. We also study solutions of a hyperradial equation in a minimal approximation for the ground angular momentum to examine two regimes: a long range and a short range cases when the inter particle distance is much greater and much less than the screening length. For these cases, we find analytical expressions for the energy and wave function for trion states. [1] L. V. Keldysh, JETP Lett. **29**, 658 (1979

Roman Ya. Kezerashvili
New York City College of Technology, City University of New York

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