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STABILITY OF EXCITONIC STATES IN AN EXTRINSEC SEMICONDUCTOR USING FEYNMAN PATH INTEGRALS

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We investigate the stability of excitonic states, which are pairs of fermionic particles, by using Feynman Path Integrals methods and Grassman algebra that best describes fermions. The system is decoupled using Berezin integral. Working in the reciprocal space allow us to write the total action functional express in terms of interacting and non-interacting Green functions. This action functional also reveals the fluctuations arriving during the displacement of the exciton in semiconductor. The Bethe Salpeter equation applied help to establish the parametrs like polarization, total energy and density of states. The binding energy is found to be large compare to the electron-hole unbound energy ending to the stability of the particle. The obtained parameters strongly depends on the impurity alowing one to predict about the future of the particle in presence of fluctuations. All these results are confirmed by the diagrams sketched and that could be a predictive experimental study on the excitonic states. It is demonstrated that the Feynman diagrams obtained are in accordance with the analytical results and reveal the fact that the system contains more fluctuations that can predict its stability. This work is a good understanding in donors impurities for transport applications of a doped semiconductor.

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Yes

Level for award
 (Hons, MSc,
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PhD

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