Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Study of the Trion Correlations in Quantum Dots with the Tight Binding Method GIAN FRANCO SACCO, Jet Propulsion Laboratory/Caltech, PAUL VON ALLMEN, Jet Propulsion Laboratory/Caltech, APPLIED CLUSTER COMPUTING TECHNOLOGIES (ACT) GROUP TEAM — The existence of a negatively or positively charged exciton bound state, also known as trion, has been proposed by Lampert in 1958. The binding energy of this complex is only of the order of a meV or less, making the task of observing such state and studying its properties particularly challenging. The importance of studying the properties of trions resides in the fact that this quasi-particle can be manipulated both electrically and optically. Many electro-optical devices utilizing the properties of trions have been proposed, such as a mobile light emitter, a memory device, and even a quantum computer. We study the properties of the trion system by means of the empirical tight-binding method, where the trion Hamiltonian is explicitly described at an atomistic level and the correlation among the constituents is included in the configuration interaction. This approach has been successfully applied to study the binding energy of excitons in quantum dots (QDs). We will extend this previous approach to describe the binding energy of trions in QDs.

Gian Franco Sacco

Date submitted: 01 Dec 2004 Electronic form version 1.4