

## **Seminar**

# **Subpicosecond Energy Transfer and Ionization in Mn-Doped CdSe Quantum Dots**

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Diluted magnetic semiconductors (DMS), especially those containing Mn dopants, have been the subject of numerous studies [1]. A key property of these materials is strong interactions between electronic states of a semiconductor host and Mn dopants, which is enhanced in strongly quantum-confined structures, such as colloidal quantum dots (QDs) [2]. Despite prediction of interactions in the subpicosecond timescale, a direct validation of the prediction is lacking. In this talk, I will present measurements of exciton-dopant interaction with 150 fs timescale in Mn-doped CdSe QDs [3]. Furthermore, we utilize these fast interactions to demonstrate hot-electron ionization in these structures [3].

### **References:**

- [1] J. K. Furdyna, "Dilute Magnetic Semiconductors", J. Appl. Phys. **64**, R29(1988)
- [2] B. Peng et al., "Theoretical Evaluation of Spin-Dependent Auger De-Excitation in Mn<sup>2+</sup>-Doped Semiconductor Nanocrystals", J. Phys. Chem. C **116**, 11223 (2012)
- [3] R. Singh et al., "Unusually Fast Energy-Gain Rates due to Spin-Exchange Auger Interactions in Mn-doped Quantum Dots" (submitted)

***Wednesday, Jan 16<sup>th</sup> 2019***

***4:00 PM (Tea/Coffee at 3:30 PM)***

***Seminar Hall, TIFR-H***