Abstract Submitted
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Dynamic Magnetic Polarization in Semi-magnetic II-VI Quantum Dots via Electrical/Optical Carrier Injection BAHMAN ROUSTAI, University of Cologne, RAMIN ABOLFATH, U. Texas at Dallas, THOMAS BRABEC, U. Ottawa, PAWEL HAWRYLAK, NRC, Ottawa — Theory of Dynamic Magnetic Polarization (DMP), the enhancement of collective spin polarization of magnetic impurities (MI) in semi-magnetic II-VI quantum dots is presented. DMP, known for nuclear spins, is the result of the transfer of electron's spin to MI's spin polarization as a function of time. DMP has been recently observed in various opto-electronic experiments [1]. We study the interplay of optically/electrically pumped electrons from the leads to the quantum dot and their effects on DMP in the dot. The interaction of MI's with electron spin and orbital degrees of freedom is modeled. In the weak coupling (t>>J), the DMP is the result of electron tunneling followed by the exchange interaction J with MI. In the strong coupling (J>>t) the electrons in the lead and the magnetic impurity in the dot form a Kondo-type bound state resulting in even stronger DMP.

[1] Ochsenbein et al. Nature Nanotechnology 4, 681 (2009).

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