Soutenance de thèse

Jeudi 21 Décembre

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Coherent optical spectroscopy of InGaAs/GaAs quantum dots doped with a single Mn atom

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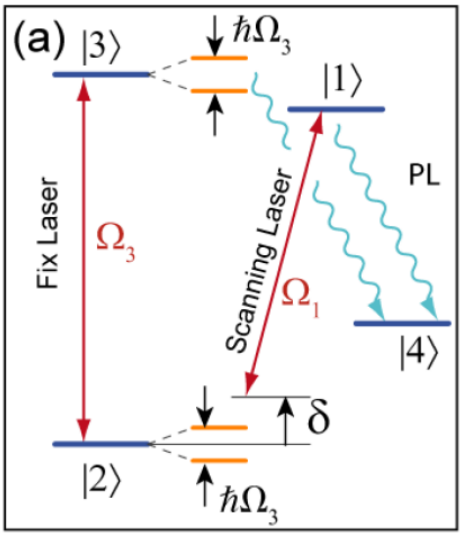
Abstract :

In the context of quantum technologies, InGaAs/GaAs:Mn quantum dots containing a single magnetic atom (a Mn atom) present a level structure and optical selection rules of great interest for the implementation of quantum protocols based on spin-photon entanglement. To confirm the potential of this system, we carried out coherent optical spectroscopy experiments. To this end, we developed a low-temperature (2K) dark-field confocal microscopy setup, based on modal filtering rejection of the reflected resonant laser in a cross-polarized configuration, to perform resonant Raman scattering measurements. By combining 1- and 2-laser experiments addressing the transitions of a V-like system, and an analysis of resonances, Autler-Townes splittings and induced transparency, with a model based on Bloch's equations, we have shown that the coherence of the addressed spin states is largely dominated by their radiative lifetime. Our work also identifies the difficulties that still need to be overcome to make this system truly interesting as a spin-photon interface.



Principle of 2-laser coherent spectroscopy applied to the levels of an InGaAs/GaAs quantum dot containing a single magnetic Manganese atom.