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Optoelectronic control of quantum states in semiconductor nanostructures

In this talk I will discuss recent developments in my group at the scientific interface between quantum optics, spin physics, nanoscience and quantum information science. Specific examples include the manipulation of charge, spin and single photons in self assembled quantum dots and molecules [1-5] and the control of light-matter interactions using sub-wavelength localisation of optical fields in nano-photonics materials [5-7]. Novel applications of these techniques will be considered, ranging from the development of optoelectronic and quantum devices to the realization concepts from quantum information science. Furthermore, future perspectives will be discussed for the exploration of new nanomaterials for optics and photonics.

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