



## Quantum Technologies in Diamond: Chance & Challenge

Presented by:

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Defect centers in diamonds have been studied extensively in the last years [1]. They represent single photon sources with stable operation even at room temperature. Additionally, their spin state provides a long decoherence time and can be controlled and read-out optically.

In this talk we focus on nitrogen vacancy (NV) centers in nano-crystalline diamond and their application as active elements in integrated on a nanophotonic platforms or as quantum nano-probes.

We introduce basic properties of nanodiamonds and discuss different methods to assemble fundamental nanophotonic devices [2], such as direct laser writing [3] and scanning probe manipulation [4]. We describe first steps towards integrated quantum devices, which aim at collecting and directing a maximum number of photons [5] or generate entanglement [6].

Finally, an application of a single NV center as quantum optical scanning probe [7] is described.

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[2] O. Benson, *Nature* **480**, 193 (2011).

[3] A. W. Schell, J. Kaschke, J. Fischer, R. Henze, J. Wolters, M. Wegener, and O. Benson, *Scientific Reports* **3**, 1577 (2013).

[4] A. W. Schell, G. Kewes, T. Schröder, J. Wolters, T. Aichele, and O. Benson, *Rev. of Scientific Instr.* **82**, 073709 (2011).

[5] J. Wolters, A. W. Schell, G. Kewes, N. Nüsse, M. Schoengen, H. Döscher, T. Hannappel, B. Löchel, M. Barth, and O. Benson, *Appl. Phys. Lett.* **97**, 141108 (2010)

[6] J. Wolters, J. Kabuss, A. Knorr, and O. Benson, *Phys. Rev. A* **89**, (2014).

[7] A. W. Schell, P. Engel, J. M. Werra, C. Wolff, K. Busch, and O. Benson, *Nano Lett.* **14**, 2623 (2014).

**Friday, October 16, 2015**

**Refreshments served**

**Seminar begins at 3:35 PM in Science Center 128**