8	**Prof. Vladimir Dyakonov**, University of Würzburg, Germany	Intrinsic defects in silicon carbide for spin-based quantum applications	We present a set of experiments demonstrating a high potential of atomic-scale defects in SiC for various spin-based applications, including quantum information processing and photonics. In particular, we show that defect spin qubits in SiC can be addressed, manipulated and selectively read out by means of the double radio-optical resonance [D. Riedel et al., Phys. Rev. Lett. 109, 226402 (2012)]. The situation reminds the one in the atomic spectroscopy, where the atoms have their individual extremely sharp optical and RF resonance fingerprints. We also generate inverse population in some intrinsic defects, resulting in stimulated microwave emission at RT. This is a crucial step towards implementation of highly-integrable solid-state masers and extraordinarily sensitive microwave detectors. As an application example, we incorporate intrinsic defects in LED structures and show that they can be electrically driven at room temperature [F. Fuchs et al., Sci. Rep.(2013); arXiv:1212.2989].
9	**Prof. Ronald Hanson**, Kavli Institute of Nanoscience Delft, The Netherlands	Quantum networks based on spins in diamond	Entanglement of spatially separated objects is one of the most intriguing phenomena that can occur in physics. Besides being of fundamental interest, entanglement is also a valuable resource in quantum information technology enabling secure quantum communication networks and distributed quantum computing. Here we present our most recent results towards the realization of scalable quantum networks with solid-state qubits.
10	**Dr. Matthew Markham**, Element Six, United Kingdom	Engineering NV centres in Synthetic Diamond	The quantum properties of the nitrogen vacancy (NV) centre in diamond has prompted rapid growth in diamond research. This initial growth was driven by the fact the NV centre provides an âeasyâ to manipulate quantum system along with opening up the possibility of a new material to deliver a solid state quantum computer. The NV defect is now moving from a quantum curiosity to a commercial development platform for a range of applications such as gyroscopes, timing and magnetometry as well as the more traditional quantum technologies such as quantum encryption and quantum simulation. These technologies are pushing the development needs of the material, and the processing of that material. The paper will describes the advances in CVD diamond synthesis with special attention to getting NV defects close to the surface of the diamond and how to process the material for diamond quantum optical applications.
11	**Prof. Jelezko Fedor**, Institute of Quantum Optics, Ulm University, Germany	Quantum sensors based on single diamond defects	NV centers in diamond are promising sensors able to detect electric and magnetic fields at nanoscale. Here we report on the detection of biomolecules using magnetic noise induced by their electron and nuclear spins. Presented results show first steps towards establishing novel sensing technology for visualizing single proteins and study of their dynamics.
12	**Dr. Tatjana Wilk**, Max-Planck-Institut für Quantenoptik, Garching, Germany	Parametric feedback cooling of a single atom inside an optical cavity	An optical cavity can be used as a kind of intensifier to study radiation features of an atom, which are hard to detect in free space, like squeezing. Such experiments make use of strong coupling between atom and cavity mode, which experimentally requires the atom to be well localized in the cavity mode. This can be achieved using feedback on the atomic motion: from intensity variations of a probe beam transmitted through the cavity information about the atomic motion is gained, which is used to synchronously modulate the trapping potential holding the atom, leading to cooling and better localization. Here, we report on efficient parametric feedback cooling of a single atom held in an intra-cavity standing wave dipole trap. In contrast to previous feedback strategies, this scheme cools the fast axial oscillation of the atom as well as the slower radial motion.