4	**Abram Falk**	Polytype control of spin qubits in silicon carbide	The search for coherently addressable spin states in technologically important materials is a promising direction for solid-state quantum information science. Silicon carbide, a particularly suitable target, is not a single material but a collection of about 250 known polytypes, each with a distinct set of physical properties and applications. We show that in spite of these differences, the 4H-, 6H-, and 3C-SiC polytypes all exhibit optically addressable spins with long coherence times. These results include room temperature spins in all three and suggest a new method for tuning quantum states using crystal polymorphism. Long spin coherence times allow us to use double electron-electron resonance to measure magnetic dipole interactions between spin ensembles in inequivalent lattice sites of the same crystal. Since such inequivalent spin have distinct optical and spin transition energies, these interactions could lead to dipole-coupled networks of separately addressable spins.
5	**Tommaso Calarco**	Quantum optimal control in AMO and NV physics	Quantum optimal control methods can be employed to increase the performance of quantum technologies up to the limits allowed by quantum mechanics in terms of fidelity and speed. After an overview of the basic concepts, I will present a recently algorithm (Chopped Random Basis optimisation) that is well suited to optimisation of many-body quantum systems, including in experiments. I will discuss its application to fast, high-fidelity qubit operations in NV centres.
6	**Prof. Milos Nesladek**, IMOMEC division, IMEC, Belgium	Fluorescent Nanodiamond for Biomedicine	NV centers in diamond have gained strong interest as a novel tool for quantum information processing, quantum computing and quantum photonics. These applications are based on fluorescent and spin properties of NV- centres. However, in some conditions NV- can lose an electron and turn to NV0. The occupation of NV0 and NV- charge states depend on the position of their ground states with respect to the Fermi level and the mechanism of the charge transfer. Interestingly, that the charge switch has important implications on applications of fluorescent nanodiamond (fND) to nano-biology and nano-medicine. fND can beused for bio-marking and bio-tracking but also for the monitoring of targeted delivery to the cells. In this presentation we review the current state-of-the art for using fND particles for fluorescent bio imaging in cells and discuss the charge transfer and its luminesce stability by using ultra high sensitive spectroscopy methods to study the NV0 and NV- state occupation.
7	**Mr. Hadden John Patrick**, University of Bristol, UK	Diamond Defect Centres for Quantum Photonics	Integrated waveguide circuits represent a leading approach to quantum photonics. Recent work has demonstrated implementations of linear optical quantum algorithms, two particle quantum walks and quantum metrology. Further development requires deterministic indistinguishable single photon sources. Defect centres in diamond show potential, with demonstrations of nondeterministic quantum interference of photons from separate NV centres[1,2]. Fabrication of photonic structures to enhance emission and collection of indistinguishable photons is required in order to improve the probability of success. We present current progress in the design and fabrication of these structures and discuss the challenge of creating cavities around single NV- centres. We also show the manipulation of single photons emitted from a Chromium defect in diamond in a single integrated waveguide chip. [1] Bernien, H. et al. Phys Rev Lett. 108, 4 (2012).[2] Sipahigil, A. et al. Phys Rev Lett, 108, 14 (2012).