9	**Dr. Brett Johnson**, University of Melbourne, Australia	Single Photon Sources in Silicon Carbide	Single photon sources in semiconductors are highly sought after as they constitute the building blocks of a diverse range of emerging technologies such as integrated quantum information processing, quantum metrology and quantum photonics. In this presentation, we show the first observation of single photon emission from deep level defects in silicon carbide (SiC). The single photon emission is photo-stable at room temperature and surprisingly bright. This represents an exciting alternative to diamond color centers since SiC possesses well-established growth and device engineering protocols. The defect is assigned to the carbon vacancy-antisite pair which gives rise to the AB photoluminescence lines. We discuss its photo-physical properties and their fabrication via electron irradiation. Preliminary measurements on 3C SiC nano-structures will also be discussed.
10	**Dr. Simpson David**, University of Melbourne, Australia	Nanoscale spin sensing in artificial cell membranes	The use of the nitrogen-vacancy (NV) centre in diamond as a single spin sensor or magnetometer has attracted considerable interest in recent years because of its unique combination of sensitivity, nanoscale resolution, and optical initialisation and readout at room temperature. Nanodiamonds in particular hold great promise as an optical magnetometer probe for bio applications. In this work we employ nanodiamonds containing single NV spins to detect freely diffusing Mn2+ ions by detecting changes in the transverse relaxation time (T2) of the single spin probe. We also report the detection of gadolinium spin labels present in an artificial cell membrane by measuring changes in the longitudinal relaxation time (T1) of the probe.
11	**Dr. Philipp Neumann**, Utiversität Stuttgart, Germany	Nanoscale temperature sensing using single defects in diamond	We experimentally demonstrate a novel nanoscale temperature sensing technique that is based on single atomic defects in diamonds, namely nitrogen vacancy color centers. Sample sizes range from millimeter down to a few tens of nanometers. In particular nanodiamonds were used as dispersed probes to acquire spatially resolved temperature proďŹles. utilizing the sensitivity of the optically accessible electron spin level structure we achieve a temperature noise ďŹoor of 5mK/âHz for bulk diamond and 130mK/âHz for nanodiamonds and accuracies of 1mK. To this end we have developed a new decoupling technique in order to suppress the otherwise limiting effect of magnetic ďŹeld ďŹuctuations. In addition, high purity isotopically enriched 12C artiďŹcial diamond is used. The high sensitivity to temperature changes adds to the well studied sensitivities to magnetic and electric ďŹelds and makes NV diamond a multipurpose nanoprobe.
12	**Dr. Georgy Astakhov**, University of Würzburg	Multi-quantum spin resonances of intrinsic defects in silicon carbide	We report the observation of multi-quantum microwave absorption and emission, induced by the optical excitation of silicon vacancy related defects in silicon carbide (SiC). In particular, we observed two-quantum transitions from +3/2 to -1/2 and from -3/2 to +1/2 spin sublevels, unambiguously indicating the spin S=3/2 ground state. Our findings may have implications for a broad range of quantum applications. On one hand, a single silicon vacancy defect is a potential source of indistinguishable microwave photon pairs due to the two-quantum emission process. On the other hand, the two-quantum absorption can be used to generate a population inversion, which is a prerequisite to fabricate solid-state maser and quantum microwave amplifier. This opens a new platform to perform cavity quantum electrodynamics experiments and quantum information processing on a single chip.