

## O 20: Invited talk (Van Hulst, Niek)

Time: Tuesday 9:30–10:15

Location: H36

**Invited Talk**

O 20.1 Tue 9:30 H36

**Control of Photon Emitters Coupled to Nano-Antennas**

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We show that the excitation-emission of single photon emitters, such as individual molecules and Q-dots, can be controlled both in time and space, on fs and nm scale. Using broad band excitation ( $\sim 120$ nm bandwidth) in combination with a pulse shaper we control the excitation of single molecules and reveal coherent response by 20-40fs vibrational wave-packets. The pulse shape can be tailored to an opti-

mum/minimum for each individual molecule, yielding a coherent control ratio of up to 4 times. Similarly by phase control of individual optical nano-antennas we adapt to the spectral phase development of the antenna, optimize the driving efficiency and generate local spatial hotspots at the antenna. Single molecules are ideal probes of the local antenna field and here we show optical fields spatially localized within 25 nm. Finally the enhancement of the radiative/excitation rates is treated, particularly how the angular emission of the coupled antenna-emitter system is highly directed. A nano-Yagi-Uda antenna is presented acting as a unidirectional single photon emitter for Q-dots in close proximity to the feed element. The controlled directivity makes such antennas a promising candidate for compact easy-to-address single photon sources or planar sensors at the single quantum level.