

WG1 - Generation, detection and storage of quantum states of light

Topics	Superconducting detectors physics and performance	Sources	Processing/memories/interfaces/applications
MATERIALS & SYSTEMS	<ul style="list-style-type: none"> - Superconducting nanowire single-photon detectors (meanders, nanodetectors) - NbN, NbTiN, WSi, MoSi, YBCO - Alternative substrates - Nano-fabrication - Waveguide detectors 	<ul style="list-style-type: none"> - Semiconductor quantum dots - Organic molecules - SPDC/SFWM - Color centres in diamond - Rare earth ion doped crystals - Trapped atoms - Electrical pumping of quantum dots 	<ul style="list-style-type: none"> - Tapered optical fibers with a nanofiber waist and >99% transmission - Tunable Whispering-Gallery-Mode (WGM) resonators with $Q > 10e8$ - Nonlinear waveguides (PPLN, PPKTP)
THEORY & MODELS	<ul style="list-style-type: none"> - Superconductivity in nanostructures - Finite difference time-domain simulation - Numerical simulations of the detection mechanism - Conventional and non-conventional superconductors 	<ul style="list-style-type: none"> - Finite difference time-domain simulation - Optical Bloch equations - Jaynes-Cummings models - Density functional theory - Fermi's Golden Rule calculations - Density matrix approach for coupling with reservoir 	<ul style="list-style-type: none"> - Semi-classical description of (arrays of) multi-level atoms with optical nearfields - Full quantum description of the interaction of multi-level atoms with WGM resonator modes
EXPERIMENTS	<ul style="list-style-type: none"> - Multi-photon excitations - Optical, electrical, temperature & magnetic field studies at < 1 K - High-temperature operation - Multilayers and novel geometries 	<ul style="list-style-type: none"> - Confocal microscopy - Correlation function measurements - Quantum interference - Low-temperature experiments - Spectral and spatial modes control - Electrical pumping 	<ul style="list-style-type: none"> - Coupling of sources to waveguide devices, open microcavities and nanocavities - Cold cesium atoms trapped and interfaced via nanofiber-guided light - CQED with single Rubidium atoms coupled to WGM resonators - Frequency conversion - Interfacing rare-earth-ion doped quantum memories with single-photon sources - Quantum random number generation with nanoscale devices - Feasibility of free-space/satellite QKD with nanoscale sources and detectors