AMOLF

PhD-student: Interacting photons in cavity arrays

Research / Job description	In this project you will couple tunable optical microcavities with nanostructured excitonic materials to achieve strong photon-photon interactions. You will use these interactions to investigate phase transitions of light, and to evidence the conditions under which noise can enhance the transport of excitations in complex systems. By designing cavity arrays with different dimensionalities and geometries, you will tailor the potential landscape in which photons hop and interact. This will allow you to emulate the behaviour of condensed matter systems with light. You will be primarily involved in all aspects of the design, realization, and analysis of experiments. In synergy with a postdoc and the group leader, you will build two optical setups: i) a tunable cavity system that can be moved to other labs at AMOLF. This will allow you to probe the nonlinear optical response of hybrid light-matter states using various ultrafast lasers and detectors. Here the aim is to investigate the physics of quantum fluids of light (e.g. a superfluid) at room-temperature. ii) a low-temperature tunable cavity system suitable for nonlinear and quantum optical experiments. Here the aim is to investigate non-equilibrium phase transitions by measuring the nonlinear dynamics of single and coupled microcavities under the influence of quantum fluctuations. You will control the strength of the photon-photon interactions via the tunable cavity, and the influence of the quantum fluctuations by tuning the frequency of the driving laser. Through these projects you will become an expert in hybrid light-matter systems, nonlinear optics, quantum optics, and condensed matter physics. You will collaborate with other AMOLF groups synthetizing organic and inorganic materials that you will place inside microcavities, and with colleagues at the University of Oxford in the design novel microcavity arrays. You will also develop theory, and work closely with theoretical groups, to interpret your experimental results.
About the group	The Interacting Photons group is part of the Center for Nanophotonics at AMOLF. Our activities officially start on November 1, 2017, but we are already preparing our labs for "hitting the ground running". We are interested in the fundamental physics, but we also value applications. We have strong connections to other groups in the Netherlands

	(particularly at AMOLF), in France, and in the UK. You will have extensive support from the group leader and the technical staff at AMOLF. You will have access to state-of-the-art nanofabrication and characterization methods at the Amsterdam NanoLab. In collaboration with other AMOLF groups you will have access to setups with a wide range of capabilities.
Required qualifications	You have an MSc in Physics or closely-related discipline. Lab experience in optics/photonics is preferable but not strictly necessary. A background or strong interest in any of the following is valued: nonlinearity, quantum optics, coupled systems, condensed matter, stochastic systems. This project involves multiple collaborations, so we are looking for a team-player.
Terms of employment	The position is intended as full-time (40 hours / week, 12 months / year) appointment in the service of the Netherlands Foundation of Scientific Research Institutes (NWO-I) for the duration of four years. After successful completion of the PhD research a PhD degree will be granted at one of the Dutch Universities. Several courses are offered, specially developed for PhD-students. AMOLF assists any new PhD-student with housing and visa applications and compensates their transport costs and furnishing expenses.
For further information please contact	Dr. Said R. K. Rodriguez Group leader Interacting Photons E-mail: srodriguez@amolf.nl Phone: +31 (0)20-754 7100
Application	You can respond to this vacancy online via the button below. Please annex your: – Resume; – Motivation on why you want to join the group (max. 1 page). Applications without this motivation will not be taken into account. However, with this motivation your application will receive our full attention.