PhD in Quantum Networking

**Faculty/department** Electrical Engineering, Mathematics and Computer Science
**Level** Master degree
**Maximum employment** Maximum of 38 hours per week (1 FTE)
**Duration of contract** 4 years
**Salary scale** €2191 to €2801 per month gross

**Electrical Engineering, Mathematics and Computer Science**
The Faculty of Electrical Engineering, Mathematics and Computer Science (EEMCS) is known worldwide for its high academic quality and the social relevance of its research programmes. The faculty’s excellent facilities accentuate its international position in teaching and research. Within this interdisciplinary and international setting the faculty employs more than 1100 employees, including about 400 graduate students and about 2100 students. Together they work on a broad range of technical innovations in the fields of sustainable energy, telecommunications, microelectronics, embedded systems, computer and software engineering, interactive multimedia and applied mathematics.

EEMCS: Your Connection to the Future.

The Department of Quantum Engineering has a double mission. The first is to bring together EEMCS researchers working on quantum computing-related topics. This line of research is intimately connected to QuTech, as the quantum computing researchers of this department are also part of the QuTech research centre. The second is to work on various other computing technologies ranging from single photon detection and liquid silicon to big data, reconfigurable architectures, and dependable nano-computing.

The Networks Architectures and Services (NAS) section educates and conducts research in the broad area of complex networks, ranging from data communications and Internetworking, to other man-made infrastructures such as road-traffic networks, and to biological, brain, social, and financial sector networks. The emphasis lies on understanding these complex, real-world networks by topological as well as spectral studies. NAS also has expertise in concepts (e.g. routing, robustness) of network architectures, in the performance analysis of quality of service-aware protocols and Internet behaviour, and in strategic and business-oriented challenges for network operators.

**Job description**
The PhD research is part of QuTech (www.qutech.nl). Assuming that quantum computers exist and can be interconnected, the aim of the open NAS position consists of an investigation from a network or system viewpoint of how Q-technology together with the classical Internet can be designed and managed. The world lacks a fundamental understanding of the performance and resilience of hybrid quantum-classical communication networking. In particular, an assessment is needed of how, where, and when new Q-concepts (such as entanglement, no cloning, Q-bit) can improve classical communication and may add new functionality (besides the perceived secure communication). How can the management and control in communication networks, enhanced with quantum communication functionality, improve the performance and
resilience of end-to-end Internet services? Which Q-functionality do we place at which network elements? What about the Q-server placement (Q-cloud), Q-routing, Q-protocols and Q-algorithms? The list of questions at this moment is rather large, illustrating the need to start investigating hybrid, quantum-classical communication networking.

**Requirements**
The NAS group has expertise in Internet measurements, network robustness and epidemics, and quantum information theory. We are looking for a brilliant PhD candidate with interest in broad aspects of quantum networking, algorithms, and communications. The candidate should know the principles of quantum mechanics well.

**Conditions of employment**
The TU Delft offers a customisable compensation package, a discount for health insurance and sport memberships, and a monthly work costs contribution. Flexible work schedules can be arranged. An International Children’s Centre offers childcare and an international primary school. Dual Career Services offers support to accompanying partners. Salary and benefits are in accordance with the Collective Labour Agreement for Dutch Universities.

As a PhD candidate you will be enrolled in the TU Delft Graduate School. The TU Delft Graduate School provides an inspiring research environment; an excellent team of supervisors, academic staff and a mentor; and a Doctoral Education Programme aimed at developing your transferable, discipline-related and research skills. Please visit http://graduateschool.tudelft.nl/ for more information.

**Information and application**
For more information about this position, please contact Prof. P. Van Mieghem, e-mail: p.f.a.vanmieghem@tudelft.nl. To apply, please e-mail a detailed CV along with a letter of application by 1 August 2017 to Prof. Van Mieghem, p.f.a.vanmieghem@tudelft.nl. When applying for this position, please refer to vacancy number EWI2016-64.

**Being an EU citizens is an advantage.**