



universität
wien

Faculty of Physics

Directorate of studies
Doctoral programme in
Natural Sciences
<http://ssc-physik.univie.ac.at>

Univ.-Prof. Mag. Dr. Thomas Pichler
Boltzmannngasse 5, 1090 Vienna

Phone +43(1) 4277 51466
Fax +43(1) 4277 851466
dspl.physics@univie.ac.at

To all members of the
Faculty of Physics

Vienna, 18 April 2017

Invitation to the public defense of the doctoral thesis

**Multi-photon interference using laser-written
waveguides for BosonSampling and related computations**

by

Max Tillmann

Monday, 24 April 2017, 17:00
IQOQI Seminar Room, 2nd floor, Boltzmannngasse 3, 1090 Vienna

Abstract

In recent years, integrated optics has gained a strong foothold in quantum photonics. Interferometrically stable networks exhibiting a high number of connected modes on a compact footprint can be manufactured via a variety of fabrication techniques. Moreover, insertion losses have become so low, that multiple single photons can be scattered through these networks. I present experimental progress on the non-classical interference of multiple, partially indistinguishable photons through arbitrary scattering networks. I will discuss how the non-classical interference of two photons can be leveraged to reconstruct the unitary matrix, describing these scattering networks, with high precision. Both, perfect non-classical interference and precise knowledge of the unitary transformation of the scattering network are prerequisites for a novel model of quantum computing, called BOSONSAMPLING. I will discuss a proof-of-principle experiment for BOSONSAMPLING, for the case of three photons interfering in a five-moded laser-written integrated network.

Defense committee:
Sébastien Tanzilli, UMR 7336 - Université Nice, F (reviewer)
Gregor Weihs, Universität Innsbruck, A (examiner)
Philip Walther (supervisor)
Caslav Bruckner (chair)