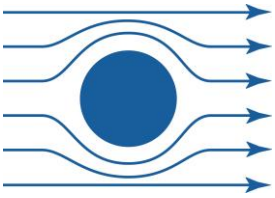

Walther-Meißner-Institut

Bayerische Akademie der Wissenschaften

Walther-Meißner-Seminar

Walther-Meißner-Institut, Seminar Room 143

(or Room 128 if noisy)

Date: **Special date: Wednesday, May 9, 2018, 13:30 h**

Speaker: **Prof. Dr. Christopher Wilson**

University of Waterloo
Electrical and Computer Engineering
Institute for Quantum Computing
200 University Ave. West
Waterloo, Ontario, Canada N2L 3G1

Title: **Generation and Distribution of Nonclassical Microwave States**

Abstract:
Nonclassical states of light will likely form an important part of next-generation communication networks that can carry quantum information, forming part of a quantum internet. They can also be a resource for distributing entanglement between spatially separated units of a larger quantum processor. These important applications and others have driven great interest in developing sources of nonclassical light. Here we present three experiments that take important steps towards developing practical sources in the microwave regime. In the first, we demonstrate a single-photon source that allows the photon wave packet to be shaped to optimally match the requirements of a quantum receiver. This work uses a novel approach: we were able shape the photons by modulating quantum vacuum fluctuations in both space and time. In the second experiment, we use a parametric superconducting cavity to produce tripartite entangled states of propagating microwave light. The technique developed can be easily extended to more modes. In addition, the entanglement structure of the states can be programmed in situ. We quantify entanglement in the states using a variety of Gaussian state measures. In the final experiment, we use higher-order nonlinearities to produce non-Gaussian tripartite states in the same system. These novel states show three-mode correlations and interference not possible with Gaussian states. To our knowledge, this is the first time such states have been produced and measured.

gez. R. Gross