

## Invitation to IQ<sup>ST</sup> Seminar

on Thursday, November 8th, 2018, 10am  
University of Stuttgart  
Pfaffenwaldring 57  
Room 6.141



**Dr. habil. Magdalena Stobińska**  
**University of Warsaw**

**Title:** Quantum interference enables constant-time quantum information processing

**Abstract:** It is an open question how fast information processing can be performed and whether quantum effects can speed up the best existing solutions. Signal extraction, analysis and compression in diagnostics, astronomy, chemistry and broadcasting builds on the discrete Fourier transform. It is implemented with the Fast Fourier Transform (FFT) algorithm that assumes a periodic input of specific lengths, which rarely holds true. A less-known transform, the Kravchuk-Fourier (KT), allows one to operate on finite strings of arbitrary length. It is of high demand in digital image processing and computer vision, but features a prohibitive runtime. We report a one-step computation of a fractional quantum KT. A quantum d-nary (qudit) architecture we use comprises only one gate and offers processing time independent of the input size. The gate may employ a multiphoton Hong-Ou-Mandel effect. Existing quantum technologies may scale it up towards diverse applications..

**Host:** Prof. Dr. Stefanie Barz, FMQ; University of Stuttgart