

**Speaker:** Danial Chughtai  
**Title:** Nonreciprocity and noise in few-mode bosonic systems  
**Date:** Friday, November 29th, 11:00 am (s.t.).  
**Place:** Seminar room 915

**Title:** Nonreciprocity and noise in few-mode bosonic systems

**Abstract:**

Have you ever wished someone would just listen to you without you needing to return the favor? This is the essence of nonreciprocity, where transmission properties of a signal change when source and detector are swapped. Such systems either amplify or outright suppress signals in one direction. Recent research shows that open quantum systems can become nonreciprocal if coherent and dissipative interactions are balanced out. This talk explores the influence of nonreciprocity on transport and thermal noise in bosonic systems. The model consists of three coherently coupled, dissipative resonators arranged in an Aharonov-Bohm ring. When one resonator becomes quasi-static, it effectively mimics the dissipative interaction - yielding nonreciprocity under the right conditions. Using input-output theory, we studied how nonreciprocity affects scattering and thermal noise in different transport regimes. We showed that nonreciprocity redistributes and frequency-filters thermal noise at the system outputs. Building on these findings, we propose a four-resonator design, that enhances the control over transport and essentially functions as a directional transistor. This offers novel ways for manipulating signals and noise in quantum information processing and communication networks.