

Speaker: Luca Peisert, University of Freiburg
Title: Optimizing Two-Photon Absorption with Domain Engineering
Date: Friday, December 4th, 16:00 m (s.t.).
Place: Seminar room 915

Title: Optimizing Two-Photon Absorption with Domain Engineering

The Master defense will investigate how entangled photon pairs can be generated by spontaneous parametric down-conversion (SPDC) and how domain engineering can be used to optimize for two-photon absorption (TPA) in a model system. We model two-photon states produced by SPDC in a quasi-phase-matched potassium titanyl phosphate (KTP) crystal and quantify their absorption probability by computing the fidelity between the generated state and the theoretically optimal TPA state. As a classical baseline, we evaluate the corresponding TPA probabilities for comparable optimized classical states. We explore different periodic poling patterns and compute the entanglement entropy of the engineered photon pairs to assess the role of spectral entanglement in enhancing absorption. Our results show that suitably domain-engineered photon pairs can achieve absorption probabilities of up to 25% compared to the optimal two-photon state, and that, across a range of detunings, entanglement enhances the TPA efficiency by an average factor of two relative to classical approaches.