

Condensed Matter Theory Center Seminar



Friday, April 5
2:00 – 3:00 pm, Physics Building 2202

Mikhail Pletyukhov

RWTH Aachen University, Germany

“Scattering of photons in 1D edge channel of a 2D topological photonic crystal”

Hybrid photonic nanostructures allow to engineer novel interesting states of light. One of the recent examples is given by the photonic crystals with topologically protected, unidirectionally-propagating (chiral) edge states of photons. We demonstrate that by coupling an array of emitters to the chiral photonic edge state one can create collective strongly correlated states of photons in a controllable way. These correlated states are topologically protected and have a number of remarkable universal properties: 1) an outcome of scattering does not depend on the position of emitters and is given only by the universal numbers, zeroes of Laguerre polynomials; 2) correlation functions demonstrate clear even-odd effect with respect to the parity of emitters' number.

In addition, we consider the model with the backscattering and study the full counting statistics of photons scattered off the local emitter. We show that in case of the initial coherent beam the scattering leads to a formation of the bimodal distribution indicating the emergence of nontrivial photonic correlations. This result can be verified in experiments on microwave scattering in transmission lines coupled to superconducting qubits.

(All are welcome to attend)

