SEMINAR: Entanglement catalysis for quantum states and noisy channels

ALEXANDER STRELTSOV

November 11, 2022
15:00 to 16:00
Blue Lecture Room

Many applications of the emerging quantum technologies, such as quantum teleportation and quantum key distribution, require singlets, maximally entangled states of two quantum bits. It is thus of utmost importance to develop optimal procedures for establishing singlets between remote parties. As has been shown very recently, singlets can be obtained from other quantum states by using a quantum catalyst, an entangled quantum system which is not changed in the procedure. We put this idea further, investigating properties of entanglement catalysis and its role for quantum communication. For transformations between bipartite pure states we prove the existence of a universal catalyst, which can enable all possible transformations in this setup. We demonstrate the advantage of catalysis in asymptotic settings, going beyond the typical assumption of independent and identically distributed systems. We further develop methods to estimate the number of singlets which can be established via a noisy quantum channel when assisted by entangled catalysts. For various types of quantum channels our results lead to optimal protocols, allowing to establish the maximal number of singlets with a single use of the channel.

Bio Alexander Streltsov, Centre of New Technologies, University of Warsaw, Poland

Alexander Streltsov received his PhD in Physics from the University of Düsseldorf in 2013 The research during his PhD was awarded with a prize for the best dissertation from th German Physical Society. In the years 2013-2017 he was Humboldt Fellow at ICFO, and a Freie Universitat Berlin, Germany. In 2017-2018 he was principal investigator of his ow project at Gdansk University of Technology, Poland. Since December 2018 he is Grou Leader at the Centre of New Technologies, University of Warsaw, Poland.

Hosted by: Maciej Lewenstein