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Einladung zum Vortrag

Quantum information processing with finite resources

von

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Abstract:

An important prerequisite for real applications of quantum technologies is reliable verification, i.e. the ability to accurately benchmark the functionality of quantum devices. What we see from recent experiments is that the further increase in complexity and size of quantum systems results in only a limited (rather low) number of produced copies of the desired quantum state, due to various technical and fundamental challenges. In such a case the following question arises: how can one reliably and efficiently perform quantum information processing, given only a finite number of instances of a quantum resource? In this talk, I will present recent developments in “single-copy” verification of quantum entanglement, which opens up new possibilities for more resource-efficient quantum state tomography. Furthermore, I will show recent results on quantum communication with limited resources, where “two-way signaling” is shown to be possible with only one exchange of a single quantum particle. These findings bring novel insights into quantum information processing, ranging from foundational to practical.