

PLUS⁺ Training and Development Program

NOV

Elements of Quantum Shannon Theory

Dr. Andreas Winter

Course Outline

The lecturer will present the basics of quantum Shannon theory from a strict one-shot perspective. This means that the quantities, min- and max-entropies, are intimately related to operational tasks, and the deceptively familiar von Neumann entropies only emerge in suitable asymptotic limits.

We will aim to cover the following information processing tasks and quantities:

- Quantum data compression (max-entropy)
- Privacy amplification (min-entropy)
- Entanglement distillation by LOCC (conditional max-entropy)
- Quantum state merging (conditional min-entropy)

In the asymptotic limit, von Neumann entropy and conditional entropy emerge, via the asymptotic equipartition property (AEP), and we can even derive the basic laws for the von Neumann entropy by information theory. Time permitting, we will touch upon several other quantities and their operational interpretation.

Calendar

- Tuesday 3rd November 10:00 – 12:00 via Teams
- Tuesday 10th November 10:00 – 12:00 via Teams
- Tuesday 17th November 10:00 – 12:00 via Teams
- Tuesday 24th November 10:00 – 12:00 via Teams

