

Allgemeines Physikalisches Kolloquium

Donnerstag, 16.04.26 – 16 Uhr c.t.
IG1 – HS 2 | Wilhelm-Klemm-Str. 10

Kolloquiums-Kaffee ab 16 Uhr vor dem Hörsaal

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Antrittsvorlesung

The Coin-toss Check – How cheating can be avoided in the future quantum internet

Imagine you want to decide who can use the family e-bike at the next day with the help of a coin toss, but you cannot observe the result of the toss on your own, as you need to communicate via phone. What is so simple on the soccer field, turns out to be extremely challenging at the distance if the communicating parties are far apart and cannot involve a third person as referee. Both parties would be tempted to communicate not the true result, heads or tails, but rather the most advantageous for themselves. But how does this connect to quantum technologies and the future quantum internet?

In my lecture, I will check for you how the tossing of coins in the quantum world can enhance the security in the future quantum internet. In this context I will present the first steps of my research team in the field of quantum cryptography beyond quantum key distribution. Using a quantum light source emitting single photons at the push of a button, we implement a coin flipping experiment in the quantum world and comparatively analyse its performance relative to alternative and classical realizations [1]. On this way we will explore, how single photons can be produced at high speed using experimental quantum technologies, how single photons can be used for ultra secure data encryption, and why this is not enough to realize all functionalities needed in a future quantum internet. Not least, we will learn about the award-winning science communication project QuanTour [2], in which a quantum light source as used in our experiments is travelling across Europe and the world ...