

# Großes Physikalisches Kolloquium an der Universität zu Köln

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## Two-dimensional materials for quantum networks

One of the major challenges for future quantum information technology is to establish a global quantum network, where different quantum systems are coupled via fiber-based single-photon channels. In such a quantum network, the analog of a bit in a classical computer, the quantum bit, has to be transferred to its optical counterpart, which is a single photon. In my talk, I will describe the main components and interfaces before discussing two-dimensional (2D) materials as a promising material platform for a quantum network.

I will discuss different promising two-dimensional (2D) materials: (i) Bilayer graphene has a high potential as a host material for so-called spin or valley qubits. In this direction, we realized the first few-electron quantum dots based on bilayer graphene, where we observed important requirements for a qubit, such as spin and valley blockade. (ii) Hexagonal boron nitride or transition metal dichalcogenides can be used as

platforms for single photon emitters, promising highly coherent and indistinguishable photons, as previously shown for self-assembled quantum dots.

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16<sup>30</sup> Uhr  
HS III

