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Quantum optics with nanobiological matter

Quantum physics is the uncontested best description of the inanimate world but it leads to phenomena which are often in conflict with our common perception of the world. This conundrum is exemplified by Schrödinger's thought experiment of a cat being dead and alive. We now ask how far we can push the idea. What mass may an object have and still be in a quantum superposition of several classically distinct states? How does the internal state of complex particles influence the quantum coherent dynamics in the presence of realistic beam splitters? How can we protect a molecule with biological functionality during state of the art quantum experiments such that it maintains biological functionality even beyond these experiments?
We will show quantum superposition experiments with a diverse set of biological nanomatter, such as vitamins, biomolecular clusters and biodyes. We present progress in experiments with amino acids and polypeptides and discuss the challenges and progress towards quantum interference studies with proteins and self-replicating molecules.

Watch presentation video

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