



Contribution ID: 20

Type: Talk

[433] Three path Quantum Cheshire Cat observed in neutron interferometry

Wednesday, 1 September 2021 17:30 (15 minutes)

The phenomenon of the Quantum Cheshire Cat is a paradoxical effect in which different properties of a particle seem to be spatially separated. To observe the effect, weak disturbances are applied in between the pre and postselection procedure in an interferometer setup. One may perform weak measurements and use weak values to quantify the perceived path occupations of the properties. Some light is shed on the first order behaviour of weak values. While the effect's first demonstration was in neutron interferometry where particle and spin properties were split, in the presented experiment the energy degree of freedom is additionally separated into a third partial neutron beam.

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Session Classification: Atomic Physics and Quantum Optics

Track Classification: Atomic Physics and Quantum Optics