

# Multipath interference tests of quantum mechanics

Gregor Weihs, Thomas Kauten, Benjamin Gschösser, Patrick Mai, and Zoltán Vörös

*Universität Innsbruck, Institut für Experimentalphysik, Technikerstrasse 25, 6020  
Innsbruck, Austria*

Several possible generalizations of quantum mechanics would show their deviation from the standard variant through their interference behavior in multipath interference experiments. These generalizations include representations based on hypercomplex numbers and on density cubes. Further, in some nonlinear versions of quantum mechanics one also would expect deviations.

In order to test for such deviations with high precision, we have constructed a very stable five-path interferometer with individually controllable phases and individual shutters for the five beams. We use quantum dots and heralded single photon sources as well as detectors with extremely low nonlinearity to reduce the systematic uncertainties in the experiment as much as possible.

We will present our experimental results that allow us to put a new and reduced upper bound on any hypothetical higher-order interference.