



Quantum Physics

Duality violation from a grating

[Daniel Mirell](#), [Stuart Mirell](#)

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Diffraction orders in the continuous wave regime generated by a Ronchi transmission grating in a standard threshold configuration are shown theoretically to violate quantum duality for a locally real representation. The phenomenon superficially resembles Rayleigh anomalies but is notably distinguished from those anomalies by a prediction of probability non-conservation. This prediction is experimentally tested with a 633 nm laser beam at normal incidence on gratings giving that threshold condition for the λ 3rd order pair. Transient intersection of the 0th order with an independent 633 nm laser beam demonstrates a duality-violating probability non-conservation in good agreement with the theoretical prediction.

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