

The analogy between optical beam shifts and quantum weak measurements

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We describe how the notion of optical beam shifts (including the spatial and angular Goos-Hänchen shift and Imbert-Federov shift) can be understood as a classical analogue of a quantum measurement of the polarization state of a paraxial beam by its transverse amplitude distribution. Under this scheme, complex quantum weak values are interpreted as spatial and angular shifts of polarized scalar components of the reflected beam. This connection leads us to predict an extra spatial shift for beams with a radially-varying phase dependence.

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