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**Whirling waves in Interference experiments** URBASI SINHA, RAHUL SAWANT, JOSEPH SAMUEL, Raman Research Institute, ANINDA SINHA, Indian Institute of Science, SUPURNA SINHA, Raman Research Institute — In a double slit interference experiment, the wave function at the screen with both slits open is not exactly the sum of the wave functions with the slits individually open one at a time. The three scenarios represent three different boundary conditions and as such, the superposition principle should not be applicable. However, most well-known text books in quantum mechanics implicitly and/or explicitly use this assumption, the wave function hypothesis, which is only approximately true. In our present study, we have used the Feynman path integral formalism to quantify contributions from non-classical paths in interference experiments which provide a measurable deviation from the wave function hypothesis [1]. A direct experimental demonstration for the existence of these non-classical paths is hard. We find that contributions from such paths can be significant and we propose simple three-slit interference experiments to directly confirm their existence. I will also describe some ongoing experimental efforts towards testing our theoretical findings.

[1] Whirling waves in interference experiments, R.Sawant, J.Samuel, A.Sinha, S.Sinha and U.Sinha, arXiv: 1308.2022.

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