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Photon Tunneling Through Dielectric Bandgaps and Evanescent Gaps NATALIA RUTTER[1], SERGEY POLYAKOV[2], PAUL LETT[3], ALAN MIGDALL[4], NIST, Gaithersburg, MD — We implement an optical tunneling testbed using the precise simultaneity of creation of twin photons produced by parametric down conversion and a Hong-Ou-Mandel interferometer. With this setup, we can measure photon traversal times of a sample with fs precision. We use this setup to compare the time for a photon to traverse dielectric stacks of odd versus even numbers of layers of alternating indexes of refraction. Preliminary data shows that subtle changes in the stack structure result in dramatic variations in photon traversal times ($\sim$10 fs) that can range from sub- to super-luminal. Our ultimate goal is to use this setup to investigate photon tunneling times in regions of true evanescent propagation and compare them to the traversal times in our dielectric stack bandgap samples where the propagation is oscillatory. This allows us to test the suitability of certain optical models of tunneling and highlight the pitfalls that occur when relying on conditional measurements.

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