Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Braiding light quanta[1] THOMAS IADECOLA, THOMAS SCHUSTER, CLAUDIO CHAMON, Boston University — The possibility that anyons quantum particles other than fermions or bosons can emerge in condensed matter systems has motivated generations of physicists. In addition to being of fundamental scientific importance, so-called non-Abelian anyons are particularly sought-after for potential applications to quantum computing. However, experimental evidence of anyons in electronic systems remains inconclusive. We propose to demonstrate non-Abelian braiding by injecting coherent states of light into topological guided modes in specially-fabricated photonic waveguide arrays. These modes are photonic analogues of topological zero modes in electronic systems. Light traveling inside spatially well-separated topological guided modes can be braided, leading to the accumulation of non-Abelian phases. We propose an optical interference experiment to probe this non-Abelian braiding directly.

[1]T.I. is supported by a National Science Foundation Graduate Research Fellowship under grant no. DGE-1247312.

Thomas Iadecola
Boston University

Date submitted: 05 Nov 2015 Electronic form version 1.4