March 13-17, 2017

Novel Optical Materials

Over the past decade and a half, there has been a revolution in novel optical materials, with new directions continuously emerging. Some of the areas that we envisage this workshop encompassing include: (i) space-time microstructures (including foldable electromagnetic structures and manipulations of boundaries in time and space, where exciting phenomena have been observed); (ii) topological insulators, where topological constraints in the bulk lead to interesting surface effects and novel devices, arising through breaking space and/or time reversal symmetries and (iii) hyperbolic materials, where the electrical permittivity has both positive and negative values, with a small imaginary part. For quasistatics, in the limit as the imaginary part goes to zero, these are closely related to space-time microstructures, with time replaced by a spatial variable. Radiation can propagate along the characteristics, and this can be used for imaging. The goals will be first to expose mathematicians to these developments, then secondly to develop a synthesis between mathematicians and other scientists, including physicists, engineers, and material scientists, to better understand these phenomena.