Spin-valley locking and topological phase transition in photonic crystals

Baile Zhang\textsuperscript{1,2}

\textsuperscript{1}Division of Physics and Applied Physics, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore.

\textsuperscript{2}Centre for Disruptive Photonic Technologies, Nanyang Technological University, Singapore.

Valley photonic crystals utilize valley as the new degree of freedom to manipulate electromagnetic waves, in much the same way as valleytronic materials steer electrons. Here we will talk about the construction of a valley photonic crystal, the realization of spin-valley locking, and the topological phase transition that is induced by the competition between spin-orbit coupling and inversion symmetry breaking. Moreover, different spin/valley-polarized states behave differently when they couple to external environment, which may find use in future photonic applications.