Artificial magnetic field effects in photonic systems

Dr. Onur Umucalılıar

ABSTRACT:

In this talk, I will present some of the outcomes of my theoretical work on photonic systems experiencing an artificial magnetic field. After a brief introduction to quantum fluids of light where the quasiparticles of light-matter interaction, namely polaritons, behave collectively in a nonequilibrium setting, I will continue with the problem of simulating a magnetic field for photons (and polaritons) which are neutral particles. I will discuss various phenomena predicted to appear in these systems ranging from the integer quantum Hall effect in a coupled cavity array to the nonequilibrium fractional quantum Hall physics where photons can be driven into strongly-correlated states resembling the Laughlin state in the presence of strong optical nonlinearity.