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Spin polarization dynamics of an exciton-polariton condensate in a ring microcavity with artificial gravity[1] SHOUVIK MUKHERJEE, University of Pittsburgh, VALERA KOZIN, ITMO University, ANTON NALITOV, IVAN SHELYKH, University Iceland, DAVID MYERS, ZHENG SUN, BURCU OZDEN, JONATHAN BEAUMARIAGE, University of Pittsburgh, LOREN PFEIFFER, KENNETH WEST, Princeton University, ANDREW DALEY, University of Strathclyde, DAVID SNOKE, University of Pittsburgh — We study the thermalization of polaritons in a semiconductor microcavity with a ring geometry above the condensation threshold. The lifetime of the polaritons is greater than the equilibration time for the system at cryogenic temperature (below 10 K), allowing the polariton condensate to come to thermal equilibrium. In the presence of a transverse electric and transverse magnetic splitting and a unidirectional cavity gradient (artificial gravity) in the ring, interesting polarization states emerge. We directly image the motion of the condensate in the ring using time-resolved optical microscopy techniques along with polarization resolution. The condensate is found to oscillate about the potential minimum, just like a rigid pendulum. The analogy to the rigid pendulum is verified by checking the dependence of the time period of the oscillations on the radius of the ring. Polarization dynamics provide an understanding of the interplay between the spin-orbit coupling, cavity tilt and energy dissipation which is behind the spatiotemporal polarization pattern formation in the ring.

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