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Quantised vortices in polariton lattices

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The first comprehensive treatment of quantised vorticity in the light of research on vortices in modern fluid mechanics appeared in Russell Donnelly seminal research papers and summarized in his 1991 book "Quantized Vortices in Helium II". Recently quantized vortices have been studied in polariton condensates. Polaritons are the mixed light-matter quasi-particles that are formed in the strong exciton-photon coupling regime. Under non-resonant optical excitation rapid relaxation of carriers and bosonic stimulation result in the formation of a non-equilibrium polariton condensate characterized by a single many-body wave-function, therefore, naturally possessing quantized vortices. Polariton condensates can be imprinted into any two-dimensional lattice by spatial modulation of the pumping laser and form vortices via interacting outfows from the pumping sites. Optically pumped polariton condensates can be injected in lattice configurations with arbitrary density profiles offering the possibility to control the kinetics of the condensate and therefore the number and location of vortices. I will present some new developments in theoretical and experimental studies of quantized vortices in polariton condensates and discuss possible practical implementations of polariton lattices.