Topological nanophotonic metasurfaces

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Abstract: Emulation of relativistic-like physics in photonic structures with Dirac spectrum has enabled observation of Klein tunneling and topological boundary modes in real and synthetic dimensions. We demonstrate another exciting emulation of trapped eigenstates of Dirac quasiparticles in photonic metasurfaces that support pseudo-spin degree of freedom. Engineered synthetic potentials in structured photonic materials give rise to electromagnetic modes endowed with some unique characteristics, such as spin-dependent radiative losses and radiation profiles directly analogous to various atomic orbitals. The proposed design approach offers a route for implementing new types of spin-full resonators and topological light sources compatible with integrated photonics platforms.

Biography: Daria Smirnova received her Ph.D. in Physics in 2016 from the Australian National University (ANU), followed by work experience in the USA, Russia and Australia. Currently, she holds a prestigious Discovery Early Career Research (DECRA) Fellow position supported by the Australian Research Council at the ANU. Dr Smirnova was recognised as one of Australia's leading young researchers in the special report by the national newspaper *The Australian* in 2020, and received *Geoff Opat Early Career Research Prize* by the *Australian and New Zealand Optical Society* in 2021. Her research interests span across nonlinear optics, multipolar electrodynamics and topological photonics.

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