TWO TOPICS FROM PHOTONICS: FLAT SURFACE BANDS AND 4D PHOTONIC LATTICES

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Photonic crystals (PhCs) are structures with dielectric constant periodic on the length scale comparable to wavelengths of the visible light. These materials obey classical Maxwell equations and share many analogies with periodic systems governed by quantum mechanical Hamiltonian. In particular, it is known that light dispersion in certain two-dimensional (2D) PhCs can possess Dirac points. We point out that, in 2D PhCs, it is possible to design surface bands that are pinned to Dirac points. We show that dispersion can be tailored: these bands can be made flat. In the second part of the seminar, we study discrete photonic lattices in more then three dimensions and point out that such systems can exist in continuous three-dimensional space. We discuss a design towards potential experimental realization and a link with atomic systems.

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[2] D. Jukić and H. Buljan, Phys. Rev. A **87**, 013814 (2013).