**Nonlinear topological phenomena in photorefractive photonic lattices**

Hrvoje Buljan

Department of Physics, Faculty of Science, University of Zagreb, 10000 Zagreb, Croatia, and

MOE Key Laboratory of Weak-Light Nonlinear Photonics, TEDA Applied Physics Institute and School of Physics, Nankai University, Tianjin 300457, China.

In this talk I will present some of the recently addressed (theoretically and experimentally) nonlinear topological phenomena in photorefractive photonic lattices including (i) nonlinear tuning of PT symmetry and non-Hermitian topological states [1], (ii) nonlinear control of photonic higher-order topological bound states in the continuum [2], (iii) nontrivial coupling of light into a defect: the interplay of nonlinearity and topology [3], and the concepts of inherited and emergent nonlinear topological phenomena [3,4]. It should be emphasized that although the phenomena are demonstrated in photorefractive lattices, they are universal and they should exist in other platforms in optics, in ultracold atomic gases and condensed matter systems, where pertinent Hamiltonians can be experimentally realized.

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[2] Z. Hu, D. Bongiovanni, D. Jukić, E. Jajtic, S. Xia, D. Song, J. Xu, R. Morandotti, H. Buljan, and Z. Chen, <https://arxiv.org/abs/2106.00360>

[3] S. Xia, D. Jukić, N. Wang, D. Smirnova, L. Smirnov, L. Tang, D. Song, A. Szameit, D. Leykam, J. Xu, Z. Chen, and H. Buljan, Light Sci. Appl. 9, 147 (2020).

[4] D. Bongiovanni, D. Jukić, Z. Hu, F. Lunić. Y. Hu, D. Song, R. Morandotti, Z. Chen, and H. Buljan, <https://arxiv.org/abs/2103.08378>