ICFO

SEMINAR: Topological light for communicating, sensing, and trapping

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16:30 to 17:30
Seminar Room

Topological complex electromagnetic waves give access to nontrivial light-matter interactions and provide additional degrees of freedom for information transfer. For instance, topologically stable quasiparticles or skyrmions have been demonstrated in quantum fields, solid-state physics, and magnetic materials, but only recently observed in photonic fields, triggering fast expanding research across different spectral ranges and applications. Here I introduce an extended family of photonic skyrmions within a unified framework, starting from fundamental theories to experimental generation and topological control in spatiotemporally structured light. I will further highlight generalized classes of structured wave topological quasiparticles beyond optical skyrmions and outline their exotic topological robust properties, emerging applications, future trends, and open challenges.
Refs: **Nat. Photonics 18**, 15-25 (2024); **Nature 638**, 394-400 (2025); **Adv. Opt. Photonics 17**(2) 295-374 (2025); **Optics & Photonics News 36,** 26-33 (2025); **Nat. Electron. 9**, 479-488 (2026)