



SFB1242

Nichtgleichgewichtsdynamik kondensierter
Materie in der Zeitdomäne

UNIVERSITÄT
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ESSEN

Open-Minded

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Campus Duisburg**

Topological Light Waves: Skyrmions can Fly!

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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 optical topological quasiparticles beyond skyrmions and outline their exotic topological robust properties, emerging applications, future trends, and open challenges.

- [1] Nature **638**, 394-400 (2025).
- [2] Adv. Opt. Photonics **17**(2) 295-374 (2025).
- [3] Optics & Photonics News **36**, 26-33 (2025).
- [4] Nat. Photonics **18**, 15-25 (2024).

Für diese Zeit steht eine Kinderbetreuung nach vorheriger Anmeldung zur Verfügung.

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