

# Ultrashort proton beams from all optical phase-space control

*Montag, 26. Januar 2026 17:00 (30 Minuten)*

We demonstrate an all-optical method for generating ultrashort, spectrally narrow proton beams using an intense laser interaction with a helical target structure. Direct measurements reveal proton pulse durations of only tens of picoseconds, substantially shorter than those obtained from conventional targets at comparable energies. This temporal compression observed is as a result of a controlled multidimensional phase-space rotation from the coil. Numerical modelling confirms the underlying dynamics and shows that the scheme is scalable to petawatt laser intensities, where monoenergetic proton beams with sub picosecond-scale durations and energies of approaching 100 MeV are predicted. This approach enables the delivery of highly collimated proton bursts on ultrafast timescales inaccessible to conventional accelerators, opening new opportunities in ultrafast science and applied nuclear and medical research.

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**Sitzung Einordnung:** Session 3 - Short Pulse 1