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Probing the phase of the elastic pp scattering amplitude with vortex proton beams

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Summary

I show that by colliding vortex proton beams (that is, non-plane-wave states with spiral phase fronts associated with non-zero orbital angular momentum) one can probe the phase of the elastic pp scattering amplitude in a novel way, which is inaccessible in the usual plane wave collisions.
I will describe the main idea and list the requirements that need to be satisfied for a proof-of-principle experiment realizing this suggestion.

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