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**Skyrmions: a showcase for non-Newtonian kinematics**[1] ARON BEEKMAN, RIKEN Center for Emergent Matter Science, NAOTO NAGAOSA, RIKEN Center for Emergent Matter Science and University of Tokyo — Consisting of hundreds or thousands of spins, skyrmions in magnets can nevertheless be regarded as individual particles that keep their identity due to topological protection. These particles interact with externally imposed waves like electric current or magnons. We have recently shown that they do this in a completely counterintuitive, non-Newtonian way. For instance, elastic scattering causes the skyrmion to move in the direction opposite to the incoming wave. The underlying reason is that the skyrmion momentum is descendant from the ferromagnetic dynamics, such that the skyrmion center of mass coordinates are each other's canonical conjugates. Here we argue that this is a general feature of dynamics of excitations in media with broken time-reversal symmetry, and is strongly related to the existence of Berry phases.

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