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Boosting the Sensitivity of Matter-wave Interferometers with Nonlinearity[1] KUNAL DAS, BRIAN KILPATRICK, Kutztown University of Pennsylvania, TOMAS OPATRNY, MICHAL KOLAR, Palacky University — We propose a mechanism to use nonlinearity arising from inter-particle interactions to significantly enhance rotation sensitivity of matter-wave interferometers. The method relies on modifying Sagnac interferometers by introducing a weak circular lattice potential that couples modes with opposite orbital angular momenta (OAM). The primary observable comprises of the modal population distributions measured at specific times. This provides an alternate mechanism for rotation sensing even in the linear non-interacting regime, while nonlinearity can improve the sensitivity, as well as operation timescales, by several orders of magnitude. We also present analogous results for a linear geometry with implications for force sensing.

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