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Damping of excitations in a dipolar Bose gas RYAN WILSON, National Institute of Standards and Technology, Joint Quantum Institute and University of Maryland, Gaithersburg, Maryland 20899, USA, STEFAN NATU, Condensed Matter Theory Center and Joint Quantum Institute, University of Maryland, College Park, Maryland 20742-4111, USA — In a Bose-condensed gas, quasiparticle excitations can undergo damping via effective condensate-mediated interactions in the collisionless regime. Motivated by recent experimental advances with condensates of highly magnetic atoms, we consider quasiparticle damping in Bose gases with dipolar interactions, where the dispersion exhibits a roton-maxon character in the appropriate trapping geometry. Following standard perturbative arguments, we derive the rates for quasiparticle damping in a collisionless Bose gas interacting with long-range interactions. We find that in the experimentally relevant temperature regime, phonons and rotons are effectively undamped in a dipolar gas owing to the nature of the low energy dispersion. Furthermore, by tuning the external magnetic field, the dipolar interaction can be made strongly anisotropic, which leads to a non-trivial dependence of the damping processes on the direction of the applied magnetic field. We discuss the implications of this work for recent experiments with highly magnetic atoms.

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