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Spin waves in a spin-1 normal Bose gas STEFAN NATU, ERICH MUELLER, Cornell University — We present a theory of spin waves in a non-condensed gas of spin-1 bosons: providing both analytic calculations of the linear theory, and full numerical simulations of the nonlinear response. We highlight the role of spin-dependent contact interactions in the dynamics of a thermal gas. Although these interactions are small compared to the thermal energy, they set the scale for low energy long wavelength spin waves. In particular, we find that the polar state of ^{87}Rb is unstable to collisional mixing of magnetic sublevels even in the normal state. We augment our analytic calculations by providing full numerical simulations of a trapped gas, explicitly demonstrating this instability. Further we show that for strong enough anti-ferromagnetic interactions, the polar gas is unstable. Finally we explore coherent population dynamics in a collisionless transversely polarized gas.

Stefan Natu
Cornell University

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