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**Supersolid phases in a realistic three-dimensional spin model** LUIS SEABRA, NIC SHANNON, University of Bristol (UK) — Supersolid phases, in which a superfluid component coexists with conventional crystalline long range order, have recently attracted a great deal of attention in the context of both helium physics and quantum spin systems. Motivated by recent experiments on $AgNiO_2$ [1], we study the magnetic phase diagram of a realistic three-dimensional spin model with single-ion anisotropy and competing interactions on a layered triangular lattice, using classical Monte Carlo simulation techniques, complemented by spin-wave calculations and Ginzburg-Landau theory. For parameters relevant to $AgNiO_2$ [2], we find a cascade of different phases as a function of magnetic field, including two phases which are supersolids the sense of Liu and Fisher [3]. One of these phases is continuously connected with the collinear ground state of $AgNiO_2$, and is accessible at relatively low values of magnetic field. The nature of this low-field transition, and the possibility of observing this new supersolid phase in $AgNiO_2$, are discussed.

[1] A. Coldea *et al.*, arXiv:0908.4169v1.
[2] E. Wheeler *et al.*, Phys Rev B **79**, 104421, (2009).
[3] K.S. Liu and M. E. Fisher, J Low Temp Phys **10**, 655 (1973).

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