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Abstract for an Invited Paper
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Pure and Random-field quantum criticality in dipolar Ising magnets¹

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A theoretical model for Mn_{12} acetates and related materials is derived. Isomer effects present in some families of host acetate materials are argued to lead to a random field of a strength which may be tuned by a magnetic field applied in a direction perpendicular to the easy axis of the Mn_{12} unit. A mean field phase diagram is presented and consequences of beyond-mean-field physics are outlined. Measureable consequences in the experimentally accessible high temperature regime are presented and in this regime the importance of a complete treatment of the molecular level structure is emphasized. Open theoretical problems are described. Work reported in Phys. Rev. B 82, 014406 (2010) and Phys. Rev. B 82, 174405 (2010). and performed in collaboration with: M. Sarachik, Bo Wen, and Lin Bo, Physics Dept. City College of New York, CUNY (funded by NSF-DMR-0451605), P. Subedi and A. D. Kent, Physics Dept., NYU, (funded by NSF-DMR-0506946 and ARO-W911NF-08-1-0364) Y. Yeshurun, Physics Dept., Bar Ilan U, (funded by Deutsche Forschungsgemeinschaft), C. Lampropoulos and G. Christou, Chemistry Dept., U. of Florida (funded by NSF -CHE-0910472).

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[2] Phys. Rev. B 82, 174405 (2010).

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