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Frustrated square lattice Heisenberg model and magnetism in Iron Telluride IGOR ZALIZNYAK, ZHIJUN XU, GENDA GU, JOHN TRANQUADA, Brookhaven National Laboratory, MATTHEW STONE, Oak Ridge National Laboratory — We have measured spin excitations in iron telluride Fe1.1Te, the parent material of (1,1) family of iron-based superconductors. It has been recognized that J1-J2-J3 frustrated Heisenberg model on a square lattice might be relevant for the unusual magnetism and, perhaps, the superconductivity in cuprates [1,2]. Recent neutron scattering measurements show that similar frustrated model might also provide reasonable account for magnetic excitations in iron pnictide materials. We find that it also describes general features of spin excitations in FeTe parent compound observed in our recent neutron measurements, as well as in those by other groups. Results imply proximity of magnetic system to the limit of extreme frustration. Selection of spin ground state under such conditions could be driven by weak extrinsic interactions, such as lattice distortion, or strain [3]. Consequently, different nonuniversal types of magnetic order could arise, both commensurate and incommensurate. These are not necessarily intrinsic to an ideal J1-J2-J3 model, but might result from lifting of its near degeneracy by weak extrinsic perturbations.

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