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Giant spin zero-point fluctuations in iron superconductors VLADIMIR ANTROPOV, Ames Laboratory, USA, PAWEL BUCZEK, FRANK ESSENBERGER, ARTHUR ERNST, LEONID SANDRATSKII, E.K.U. GROSS, MPI Halle, Germany — We analyze the strength of quantum spin fluctuations in novel iron superconductors. By using linear response calculations and the density functional approach, we show that many of these materials can be classified as highly responsive magnetic materials with very strong non-linear quantum spin fluctuations. Furthermore, by using the newly developed theory of magnetic instabilities in systems with strong spin zero-point motion, we show that the inclusion of fluctuations dramatically improves an agreement with the experiment for systems such as CaFe_2As_2 , LiFeAs and FeSe , while for FeTe , the results are less affected by fluctuations. We demonstrate how spin fluctuations influence the criteria of local magnetic moment and long range magnetic order existence. In addition to iron superconductors, several other groups of materials with possible giant quantum spin fluctuations are identified.

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