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Revealing the dual nature of magnetism in iron pnictides and iron chalcogenides using x-ray emission spectroscopy HLYNUR GRETARSSON, ANDREEA LUPASCU, YOUNG-JUNE KIM, WENLONG WU, STEPHEN R. JULIAN, University of Toronto, JUNGHO KIM, DIEGO CASA, THOMAS GOG, Argonne National Laboratory, ZHI JUN XU, JIN SHENG WEN, GENDA GU, Brookhaven National Laboratory, R.H. YUAN, Z.G. CHEN, NAN-LIN WANG, Chinese Academy of Sciences, SEUNGHYUN KHIM, KEE HOON KIM, Seoul National University, IGNACE JARRIGE, SHINICHI SHAMOTO, M. ISHIKADO, Japan Atomic Energy Agency, JIUN-HAW CHU, IAN RANDAL FISHER, Stanford University — We present a Fe Kβ x-ray emission spectroscopy study of local magnetic moments in various iron-based superconductors in their paramagnetic phases. Our findings show that a local magnetic moments exists in all samples studied: PrFeAsO, $Ba(Fe,Co)_2As_2$, LiFeAs, Fe_{1+x}(Te,Se), and $A_2Fe_4Se_5$ (where A = K, Rb, and Cs). The moment size is independent of temperature or carrier concentration, but varies significantly across different families. Specifically, all iron pnictides samples have local moments of about $1\mu_B$/Fe, while FeTe and $K_2Fe_4Se_5$ families have much larger local moments of $\sim 2\mu_B$/Fe and $\sim 3.3\mu_B$/Fe, respectively. Our results illustrate the importance of multi-orbital physics in describing magnetism of these compounds.

[X] Prefer Oral Session
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Hlynur Gretarsson
gretarss@physics.utoronto.ca
University of Toronto

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