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Spin-Orbit Induced Emergent Magnetic Phases in Iridium Based Oxides[1] INDRA DASGUPTA, Department of Solid State Physics, Indian Association for the Cultivation of Science, Jadavpur, Kolkata 700032 — We shall present our results on the electronic structure of 6H perovskite type quaternary iridates $Ba_3MIr_2O_9$, where Ir ions form structural dimers and non magnetic M provides a knob to tailor the valence of Ir. We shall first consider the $d^{4.5}$ insulator $Ba_3YIr_2O_9$ and explain the origin of the pressure induced magnetic transition to a spin-orbital liquid (SOL) state in this system. As a next example [2], we shall consider a pentavalent (d^4) 6H perovskite iridate $Ba_3ZnIr_2O_9$ and argue that the ground state of this system is a realization of novel SOL state. Our results reveal that such a system provides a very close realization of the elusive J=0 state where Ir local moments are generated due to the comparable energy scales of the singlet-triplet splitting driven by spin-orbit coupling (SOC) and the superexchange interaction mediated by strong intra-dimer hopping, however substantial frustrated interdimer exchange interactions induce quantum fluctuations favoring SOL phase at low enough temperature. [1] S.K. Panda, S. Bhowal, Ying Li, S. Ganguly, Roser Valenti, L. Nordstrom, and I. Dasgupta Physical Review B (Rapid Communication), 2015 (Accepted for Publication), [2] A. Nag et. al. arXiv:1506.04312 [cond-mat.str-el]

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