

Abstract Submitted  
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**Unanticipated spin gap measured in the frustrated quasi-FCC  $d^3$  double perovskites  $La_2LiXO_6$  ( $X = \text{Ru, Os}$ )** DALINI D MAHARAJ, GABRIELE SALA, CASEY A MARJERRISON, JOHN GREEDAN, BRUCE GAULIN, McMaster University, MATTHEW STONE, Spallation Neutron Source, Oak Ridge National Laboratory — There is much current interest in the influence of strong spin-orbit (SO) interactions on exotic ground state selection in new 4d and 5d magnets, particularly involving  $4d^5$  Ir. Here we consider double perovskites of the form  $A_2BB'O_6$  which are based on heavy 4d or 5d magnetic ions, where the SO interaction is expected to be significant as it increases as  $\sim Z^4$ . The double perovskite structure can accommodate a variety of magnetic ions on the B' site, providing a playground for systematic studies of the exotic ground states stabilized by strong SO coupling. Here, we report inelastic neutron scattering (INS) measurements conducted on the frustrated monoclinic magnets,  $La_2LiXO_6$  ( $X = \text{Ru, Os}$ ), wherein the magnetic moments decorate a quasi face-centered-cubic lattice. Our results show the development of a spin gap in the spin excitation spectrum of size  $\Delta_{Os} = 8$  meV and  $\Delta_{Ru} = 2.5$  meV concomitant with  $T_N$ , which is unexpected for orbitally quenched  $d^3$  systems. We liken these results to INS results obtained for  $Ba_2YXO_6$  and  $La_2NaXO_6$ , which were also shown to exhibit spin gaps that correlate with  $T_N$ . We shall discuss trends observed in these three  $d^3$  double perovskite families which correlate strong SO coupling, spin gap and  $T_N$ .

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