



Contribution ID: 77

Type: **Poster**

## Magnetic order induced energy-gap in Sr<sub>2</sub>IrO<sub>4</sub>

*Friday, 16 September 2011 12:51 (2 minutes)*

For many years the interest for transition metal oxides (TMO) has been dominated by the layered copper (3d) oxides e.g. high-temperature superconductors. With developments in sample growing technique, scientists have started to move down the periodic table. Our work focuses on the related 5d TMO, Sr<sub>2</sub>IrO<sub>4</sub>, which is expected to display a spin-1/2 Kramers doublet ground state. However, while Sr<sub>2</sub>RuO<sub>4</sub> shows the expected metallic behaviour, Sr<sub>2</sub>IrO<sub>4</sub> display an energy-gap at the Fermi level. Of many suggestions for the origin of this gap, only two possible suggestions remains: (1) A spin-density wave (SDW) order, or (2) A relativistic spin-orbital (SO) coupling, as recently proposed by ARPES measurements and LDA calculations. Here, we have used the power of muSR to investigate the possible presence of static magnetic order in this compound. From ZF measurements we find a long-range magnet order below T<sub>c</sub>=240 K. Consequently, the energy-gap could most likely be deduced to the presence of magnetic ordering e.g. SDW. This also fits fits well into a recent suggestion that Sr<sub>2</sub>IrO<sub>4</sub> could display high-temperature superconductivity upon electron doping.

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Multiple order parameter systems

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**Session Classification:** Poster session II and lunch

**Track Classification:** Poster Session II (Friday)