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Orbital Order and Metal-Insulator Transition in $PbRuO_3$ SIMON KIMBER, Hahn-Meitner Institute, JENNIFER RODGERS, J. PAUL ATTFIELD, School of Chemistry, University of Edinburgh, DIMITRI ARGYRIOU, Hahn-Meitner Institute — We have prepared the previously uncharacterised perovskite, $PbRuO_3$, using a high P/T synthesis technique (10 GPa, 1000 $^\circ$C) and performed synchrotron powder x-ray diffraction (ID31, ESRF), powder neutron diffraction (GEM, ISIS) and physical propety measurements. $PbRuO_3$ undergoes a metal insulator transition at $\sim$ 90 K at which the resistivity jumps by four orders of magnitude. The susceptibility of $PbRuO_3$ shows a paramagnetic-paramagnetic anomaly at 90 K, and at lower temperatures, a broad maximum. At RT, the diffraction profile of $PbRuO_3$ is well fitted by a distorted perovskite structure in the space group *Pnma*. On cooling through $\sim$ 90 K, $PbRuO_3$ undergoes a structural transition, the low temperature structure is well fitted in the *Imma* space group. The *Imma* phase shows layered Ru^{4+} orbital order, we speculate that this dimensional reduction results in the broad maximum seen in the magnetic susceptibility measurements. The structural transition is first order and phase separation is seen at 75 K. The possible role of Pb – O covalency in inducing orbital order will be discussed.

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