**Ba$_2$YRuO$_6$: High-T$_c$ superconductivity without CuO$_2$ planes.**

HERMANN AZEMTSA DONFACK, Arizona State University — Doped Ba$_2$YRuO$_6$ begins superconducting at 93 K, although it has no cuprate-planes. It does have Cu as a dopant, but superconducts with so little Cu (1%) [S. M. Rao et al., J. Crystal Growth 235, 271 (2002)] that it is clearly not a cuprate-plane superconductor. This means that CuO$_2$ planes are not needed for high-T$_c$ superconductivity. It also means that all theories of high-T$_c$ superconductivity based on cuprate-planes superconducting are incorrect, or else that there are at least two theories of high-T$_c$ superconductivity, not just one: one for cuprate-plane materials, and one for ruthenates. (It is our opinion that there is just one theory of high-T$_c$ superconductivity, and that it involves superconductivity in the BaO or similar layers.) In doped Sr$_2$YRuO$_6$, a sister compound of Ba$_2$YRuO$_6$ that begins superconducting at 49 K, the superconductivity is clearly in the (SrO)$_2$ layers, not in the Cu-doped YRuO$_4$ layers, which contain magnetic fields of order 3 kG in zero applied field, and so are unlikely layers to superconduct [J. D. Dow and D. R. Harshman, J. Low Temp. Phys. 131, 483 (2003)]. Unlike doped Ba$_2$YRuO$_6$, doped Ba$_2$GdRuO$_6$ does not superconduct, because Cooper pairs in the BaO layer are disrupted by the magnetic ion Gd.