Magnetic, thermal and transport properties of $Y_{2-x}Bi_xRu_2O_7$ in the matallic phase

A. Zarzycki,[1] M. Rams,[2] E.A. Görlich,[2] and K. Tomala[2]

[1] *H. Niewodniczański Institute of Nuclear Physics, PAS, Kraków*

[2] *M. Smoluchowski Institute of Physics, Jagiellonian University, Kraków*

Ruthenium oxide $Y_2Ru_2O_7$ is an antiferromagnetically ordered Mott insulator with the Néel temperature of $T_N \simeq 76$ K. Dilution of the yttrium sublattice with tetravalent bismuth ions leads to the metal-insulator transition at around the critical bismuth concentration $x_{cr} \approx 0.53$. Nevertheless, some traces of the insulating phase survive at low temperatures even for systems with $x > 1$.

Two samples with bismuth concentrations of $x = 1.2$ and 1.5 were investigated above 0.4 K. Temperature dependence of the magnetic susceptibility below $T \approx 100$ K can be described by the power law $\chi \sim T^{-\lambda}$ with $\lambda = 0.50(2)$. Heat capacity can be analysed taking into account the electronic contribution in which, apart from the usual Fermi-liquid term $C/T = const$, a spin fluctuations contribution of the form $-T^3 \log(T/T_0)$ is taken into account. The electrical resistivity shows the Fermi-liquid dependence $\rho \sim T^2$ at low temperatures which changes to the anomalous behaviour $\rho \sim T^{3/2}$ above about 3 K. Application of the external magnetic field broadens the Fermi-liquid region.