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Universal *T*-linear Resistivity and Planckian Limit in Overdoped Cuprates

The perfectly linear temperature dependence of the electrical resistivity observed as $T \rightarrow 0$ in a variety of metals close to a quantum critical point (QCP) is a major puzzle of condensed matter physics [1-3]. In cuprates, a *T*-linear resistivity as $T \rightarrow 0$ has been observed in few families once superconductivity is suppressed by a magnetic field. On the electron-doped side, *T*-linear resistivity is seen just above the QCP where AF order ends [4]. On the hole-doped side, however, the doping values where *T*-linear is observed are very far from the QCP where long-range AF order ends. Instead, these values are close to the critical doping where the pseudogap phase ends [5]. Several questions must be answered. Is *T*-linear resistivity generic in cuprates? Is there a common mechanism linking cuprates to the other metals where $\rho \sim T$ as $T \rightarrow 0$? We measured the low-temperature resistivity of the bi-layer cuprate $Bi_2Sr_2CaCu_2O_{8}$+ä and found that it exhibits a *T*-linear dependence with the same slope as in the other hole-doped cuprates. It has been proposed that T-linear resistivity may be associated with the scattering rate $1/\tau$ reaching the Planckian limit, i.e. $\hbar / \tau = k_B T$ [6, 7]. We show that the Planckian limit is obeyed in all cuprates where a pure *T*-linear resistivity has so far been observed.

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