Apparent linear resistivity in κ-(BEDT-TTF)$_2$Cu(NCS)$_2$

C. Pasquier,[1] C. Essghaier[1], P. Auban-Senzier[1]

[1] *Université Paris-Saclay, CNRS, Laboratoire de Physique des Solides, 91405, Orsay, France, e-mail: claude.pasquier@universite-paris-saclay.fr*

We have observed in a wide range of magnetic fields and temperature an unexpected linear in temperature variation of the resistivity for the 2D molecular superconductor κ-(BEDT-TTF)$_2$Cu(NCS)$_2$ (see Figure 1). This behavior is retained under pressure (P) and–observed only below T_{c0}(P) where T_{c0}(P) is the zero magnetic field critical temperature at the pressure P.
Such a linear behavior is the subject of an intense activity in the framework of unconventional superconductivity: it is observed in cuprates[1], pnictides, and even quasi-1D molecular conductors of the TMTSF family. In these compounds, this linear behavior of the resistivity ($\rho(T)=\rho_0+AT$) has been attributed to a Planckian diffusion of the carriers in contrast to the expected quadratic behavior ($\rho(T)=\rho'_0+BT^2$) associated to electron-electron interaction.

We will present a careful analysis of the data in the title compound in the framework of this Planckian mechanism. However, this model does not seem to fit correctly the data and alternative models including superconducting fluctuations will be discussed [2].

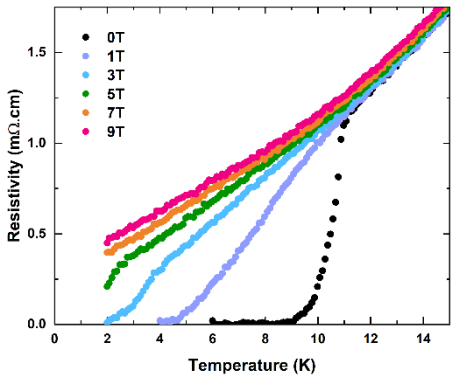

Fig. 1. In-plane resistivity of κ-(BEDT-TTF)$_2$Cu(NCS)$_2$ as a function of temperature at various magnetic fields from 0 to 9 Tesla. At high field, a clear linear behavior of the resistivity is observed.

References

[1] A. Legros, S. Benhabib, W. Tabis, et al. Universal T-linear resistivity and Planckian dissipation in overdoped cuprates. *Nature Phys*. **15**, 142–147 (2019).
[2] C. Essghaier, P. Auban-Senzier, C. Pasquier, *in preparation.*