The interlayer magnetoresistance $\rho_{zz}$ of the organic metal $\kappa$-(BEDT-TTF)$_2$Cu(NCS)$_2$ has been studied as a function of field (0-45 T) and temperature (0.5-40 K). The peak in $\rho_{zz}$ seen in in-plane fields, a definitive signature of interlayer coherence, remains to temperatures exceeding the Anderson criterion for incoherent transport by a factor $\sim 30$. Angle-dependent magnetoresistance oscillations (Fig. 1) were modeled using an approach based on field-induced quasiparticle paths on a 3D Fermi surface, to yield the temperature ($T$) dependence of the scattering rate (Fig. 2). The results suggest that the scattering rate does not vary strongly over the Fermi surface, and that it has a $T^2$ dependence due to electron-electron scattering (Fig. 2) [1]. This observation calls into question some of the models for superconductivity in the organics [1].

Figure 1 (left). Comparison of experimental $\rho_{zz}$ AMRO data (a) and the numerical simulation (b) method described in [1] ($T = 1.5$ K); for the lowest to the highest traces, the field is 32, 34, 36, 38, 40, 42 and 44 T (no offset is applied). Here, the AMRO result from quasi-one-dimensional (Q1D) Fermi-surface sections [1]. (c) AMRO data for quasi-two-dimensional (Q2D) Fermi-surface sections ($T = 1.5$ K and fields of 20 (lowest), 24 and 28 T (highest). The arrow indicates the amplitude of a particular AMRO feature. (d) Experimental normalized AMRO amplitudes plotted as a function of the orbit angular frequency times scattering time; data all fall on a common curve for a particular plane of rotation [1]. Figure 2 (right) Scattering time deduced from AMROs due to the Q1D Fermi surface sections (a) and the Q2D Fermi-surface sections (b) versus $T$. Consistent scattering times are deduced from several AMRO features at fields of 30 T and 45 T. The $T^2$ scattering rates are identical to within experimental errors, even though the AMROs in (a) and (b) are produced by different Fermi-surface sections.