Characterizing weak-link effects in Mo/Au transition-edge sensors

We are developing Mo/Au bilayer transition-edge sensors (TESs) for applications in X-ray astronomy. Critical current measurements on these TESs show they act as weak superconducting links exhibiting oscillatory, Fraunhofer-like, behavior with applied magnetic field. In this contribution we investigate the implications of this behavior for TES detectors, under operational bias conditions. This includes characterizing the logarithmic resistance sensitivity with temperature, α, and current, β, as a function of applied magnetic field and bias point within the resistive transition. Results show that these important device parameters exhibit similar oscillatory behavior with applied magnetic field, which in turn affects the signal responsivity, noise and energy resolution.

We compare results for devices that have different geometric contact regions between the absorber and TES, which show different critical current and transition characteristics as a function of applied magnetic field.