

Developing Tkinter-Based Application for Processing Electrical Transport Data Measured in Pulsed Magnetic Fields

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Pulsed magnetic fields provide access to extreme field regimes that are essential for probing quantum phenomena and characterizing complex material behaviors. However, their rapid field ramping introduces substantial measurement challenges, particularly the emergence of large Faraday-induced voltages in electrical transport setups. These unwanted voltages, arising from the time derivative of the magnetic flux, can exceed the intrinsic sample signal by orders of magnitude and result in misleading asymmetries between the up-sweep and down-sweep of the magnetic field. This artifact not only distorts critical features such as quantum oscillations and resistive transitions but also complicates post-experimental analysis. To address this issue, we developed a Python-based software tool equipped with a graphical user interface (GUI) using the Tkinter library. The program enables users to automatically correct for the Faraday-induced voltage component by leveraging the inherent antisymmetry of the induced signal between rising and falling field sweeps. It applies a least-squares fitting algorithm to extract normalization coefficients (A_x and A_y) that best describe the proportional contribution of the induced signal in each voltage channel. These coefficients are then used to reconstruct and subtract the unwanted induced voltage component, yielding clean, symmetrized transport data. The GUI design prioritizes accessibility, allowing experimentalists with no programming experience to process their data through a point-and-click interface. Applied to real datasets from pulsed high-field measurements, the tool demonstrated excellent performance in recovering the true voltage response of materials, reducing up/down-sweep discrepancies to within noise levels. By removing the inductive artifact, the program clarifies transport signatures, improves interpretability, and enables consistent analysis across datasets. This tool significantly enhances the workflow efficiency and measurement fidelity for condensed matter researchers utilizing pulsed field environments.