

Exponential decay in inter-Landau level transitions of Dirac semimetals

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Abstract: In magneto-optics experiments on Dirac semimetals, inter-Landau levels transitions are typically seen in color plots representing a « fan diagram ». The evolution of the peak width according to the magnetic field B and the transition index n gives useful information about the relaxation time τ of the electrons. In this work, two approaches were developed to extract the peak width from the color plot. The first approach is based on peak detection followed by Gaussian fitting. The second approach applies a variable change and leads to an empirical law of exponentially decaying cosine. The relevance of this newly found relation was tested on different samples. Finally, the comparison between both approaches provides an optimal algorithm to automate the peak width extraction.

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