Effect of structural disorder on quantum oscillations in graphite

B. C. Camargo [1], Y. Kopelevich [1] M. A. Cotta [1], S. B. Hubbard [2], A. Usher [2], W. Böhlmann [3] and P. Esquinazi [3]

[1] *Instituto de Fisica "Gleb Wataghin", Universidade Estadual de Campinas, Unicamp 13083-970, Campinas, Sao Paulo (Brazil)*
[2] *School of Physics, University of Exeter, Stocker Road, Exeter EX4 4QL (UK)*
[3]*Division of Superconductivity and Magnetism, Institute for Experimental Physics II, University of Leipzig, Linnestrasse 5, D-04103 Leipzig (Germany);*

We studied effects of structural disorder on Shubnikov de Haas (SdH) and de Haas van Alphen (dHvA) quantum oscillations measured in single crystalline and highly oriented pyrolitic graphite samples down to temperature T = 30 mK and magnetic field up to B = 14 T. The measurements were performed on samples with different mosaicity characterized by means of x-ray difraction, transmission electron microscopy (TEM) and surface roughness measurements. The obtained results revealed a correlation between the occurrence of quantum oscillations and the sample structural disorder. Namely, dHvA and SdH effects are most attenuated in disordered samples that possess a pronounced surface roughness. We also demonstrate that the presence of sharp interfaces in graphite due to stacking disorder can enhance de amplitude of the quantum oscillations.