Electrical transport of Na_xCoO_2 single crystals in high-magnetic fields

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Rich variety of physical properties have been observed in the sodium cobaltates Na_xCoO_2**:** ordered magnetic states, large thermoelectric effect, superconductivity *etc*. These effects occur due to complex band structure and strong interplay between Na atomic ordering and the electronic density on the Co sites [1]. However Fermi surface peculiarities of the sodium cobaltates is still under debate. Pockets on the Fermi surface should exist according to the theoretical predictions, but only single hole like surface was detected by angle-resolved photoemission studies. Both approaches have pros and cons and independent experimental methods like the Shubnikov–de Haas oscillations could resolve a dispute.

We have synthesized high quality single crystals of sodium cobaltates with x = 0.5-0.8 using optical floating zone technique and electrochemical treatment [2]. In this poster we report the results of investigation of electrical transport of sodium cobaltates crystals with different sodium content at very low temperatures and very high magnetic fields. As example some of our experimental results for a $Na_{0.77}CoO_2$ compound are shown in fig.1.

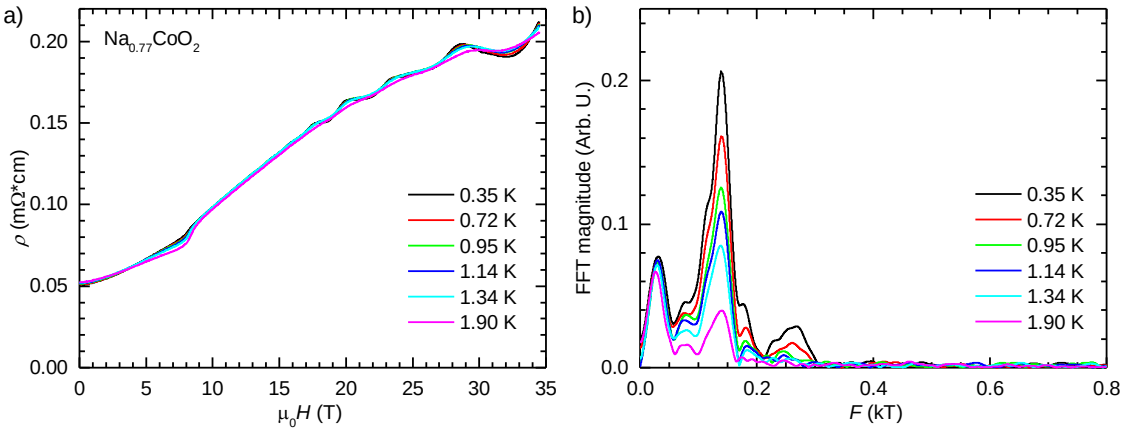

Fig.1 a) Resistivity ρ as a function of field for a $Na_{0.77}CoO_2$ single crystal. b) Amplitude of the fast Fourier transform (FFT) for several values of temperature. Two main frequencies are detected: F_1 = 31 T and F_2 = 140 T.

References

[1] Y.V. Lysogorskiy, S.A. Krivenko, I.R. Mukhamedshin, O.V. Nedopekin, D.A. Tayurskii, Phys. Rev. B, **2016**, 94, 205138.

[2] I.F. Gilmutdinov, I.R. Mukhamedshin, F. Rullier-Albenque, H. Alloul, J. Phys. Chem. Solids, **2018**, 121, 145-150.

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