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Optical investigations on $Na_{0.7}CoO_2$ LEONARDO DEGIORGI, GIULIO CAIMI, ETH Zurich, HELMUT BERGER, EPF Lausanne — The discovery of superconductivity at 5 K in hydrated sodium cobaltate has attracted considerable attention. The investigation of non-hydrated sample is of relevance for the understanding of superconductivity and a considerable research effort has been devoted to Na_xCoO_2 specimens with x ranging between 0.3 and 0.85. We present the optical properties of $Na_{0.7}CoO_2$ single crystals, measured over a broad spectral range as a function of temperature (T). The capability to cover the energy range from the far-infrared up to the ultraviolet allows us to perform reliable Kramers-Kronig transformation, in order to obtain the absorption spectrum (i.e., the complex optical conductivity). To the complex optical conductivity we apply the generalized Drude model, extracting the frequency dependence of the scattering rate (Γ) and effective mass (m^*) of the itinerant charge carriers. We find that $\Gamma(\omega) \sim \omega$ at low temperatures and for $\omega > T$. This suggests that $Na_{0.7}CoO_2$ is at the verge of a spin-density-wave metallic phase.

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