Optical evidence for a magnetically driven structural transition in the spin web Cu$_3$TeO$_6$

L. DEGIORGI, G. CAIMI, ETH Zurich, H. BERGER, L. FORRO', EPF Lausanne — Cu$_3$TeO$_6$ is a modest frustrated $S = 1/2$ spin system, which undergoes an anti-ferromagnetic transition at $T_N \sim 61\, K$. The anti-ferromagnetic spin alignment in Cu$_3$TeO$_6$ below $T_N$ is supposed to induce a magneto-elastic strain of the lattice. The complete absorption spectrum of Cu$_3$TeO$_6$ is obtained through Kramers-Kronig transformation of the optical reflectivity, measured from the far-infrared up to the ultraviolet spectral range as a function of temperature ($T$). Below $T^* \sim 50\, K$, we find a new mode at 208 cm$^{-1}$. The spectral weight associated to this additional mode increases as $\propto (T^* - T)^{1/2}$ with decreasing $T$ below $T^*$. The implication of the optical findings will be discussed in relation to the magnetic phase transition at $T_N$. 

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