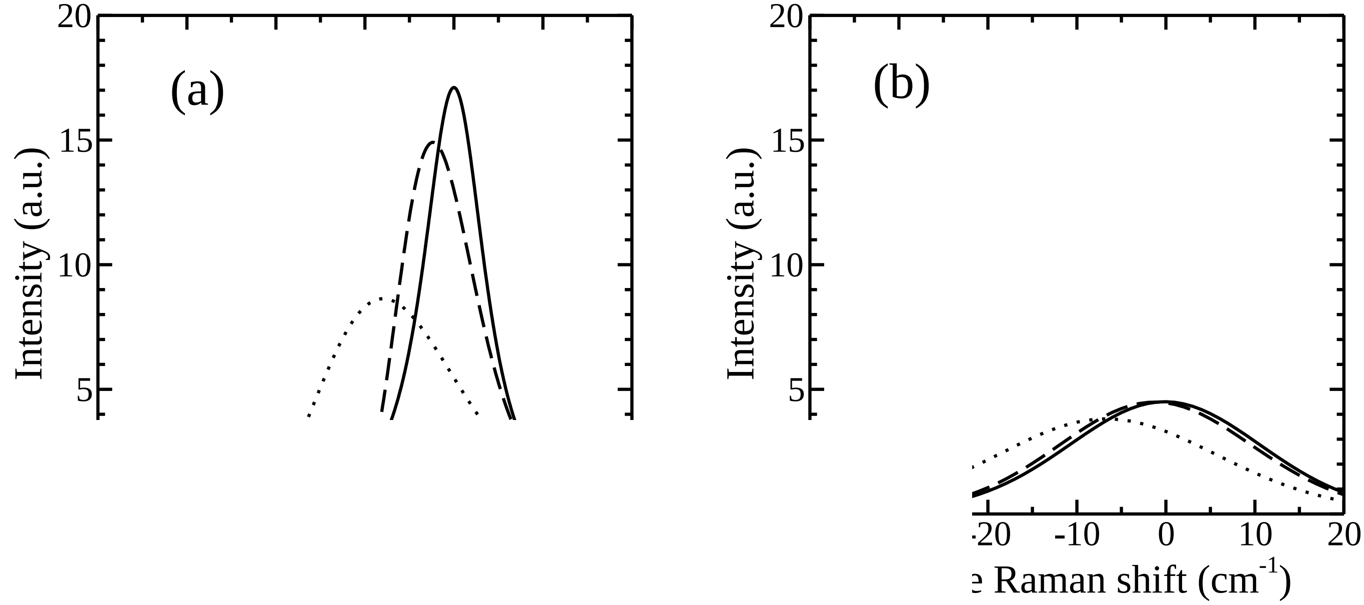

n^{-1}-wide Gaussian curve as given by
taman shift is measured with respect

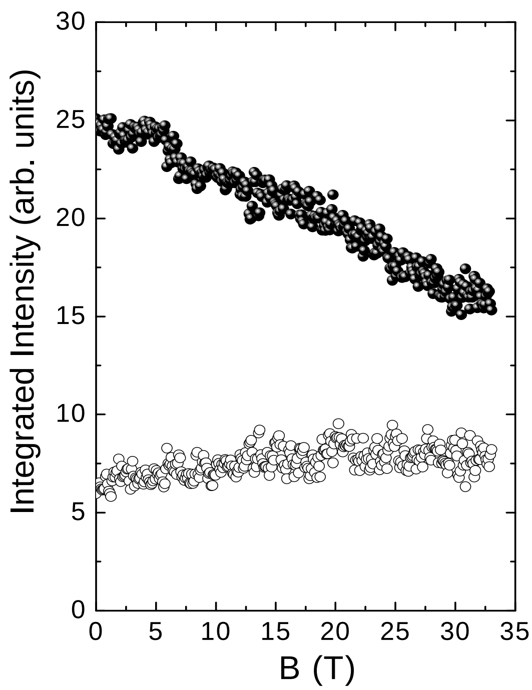

FIG. 5: Integrated intensity of the 2D band low energy component (black dots) and of the 2D band high energy component (open circles) as a function of the magnetic field.

performed in a quantizing magnetic field, and *a priori* the scattering rate does not have to be the same.[35]

From Eq. (1) it can be seen that the integral $\int |\mathcal{M}(q)|^2 dq$ does not depend on the magnetic field. (It is sufficient to integrate over q first, and then over z; the magnetic field enters only through R, which drops out.) This means that under the assumption of a constant phonon density of states, the frequency-integrated intensity (the area under the peak) of the $2D$ band should not depend on the magnetic field. The experimental intensities for the two components are plotted on Fig. 5. Only the integrated intensity of the high-frequency component is field independent, while an overall decrease of $\sim 35\%$ of the integrated intensity of the low-frequency component is observed over the range of B between 0 and 33 T. Does it mean that the phonon density of states decreases stronger for the lower-frequency component? Again, without precise knowledge of the exact nature of the two components it is hard to give an explanation for their different behavior.

IV. CONCLUSIONS

In conclusion, we have studied, both experimentally and theoretically, the evolution of the $2D$ band of MEG structures in intense magnetic fields. We observe a red shift and a broadening of the $2D$ band as the magnetic field is increased. We have modelled this effect using a semi-classical picture in which the Lorentz force induced by the magnetic field on the photo-created electron-hole pairs, curves the carriers trajectories. This leads to a decrease of the emitted optical phonon momentum and a broadening of the $2D$ band as observed through Raman scattering spectroscopy. This model enables us to extract the value of the electronic scattering rate. From this we conclude that about half of the $2D$ band width