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From 2D graphene to 1D graphene nanoribbons: dimensional crossover signals in the structural thermal fluctuations ARIEL DOBRY, Instituto de Física Rosario (Argentine), SEBASTIÁN COSTAMAGNA, International School for Advanced Studies (Italy) and tituto de Física Rosario (Argentine) — I this work, by analyzing the thermal excited rippling in the graphene honeycomb lattice, we find clear signals of an existing dimensional crossover from 2D to 1D while reducing one of the dimensions of the graphene layer. Trough a joint study, using montecarlo atomistic simulations and analytical calculation based, we find that the normal-normal correlation function $G(q)$ does not change the power law behavior valid on the long wavelength limit, however the system size dependency of the quadratic out of plane displacement h^2 shows a breakdown of its corresponding scaling law. In this case we show that a new scaling law appear which correspond to a truly 1D system. On the basis of these results, and having explored a wide number of realistic systems size, we conclude that narrow nanoribbons presents strongest corrugations than the square graphene sheets. This result could have important consequences on the electron transport properties of freestanding graphene systems.

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