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# SÉMINAIRE

## Lundi 25 janvier, 14h30

*Salle de conférence, Bâtiment 15  
Campus Boucicaut, 140 rue de Lourmel, 75015 Paris*

### **Stefano MOSSA**

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# **ACOUSTIC MODES IN GLASSES AND THE BREAKDOWN OF THE DEBYE APPROXIMATION**

The Debye approximation for the acoustic modes in crystals is based on the assumption that the medium is an elastic continuum. This holds true for wavelengths much larger than the typical interatomic distance and gradually breaks down on approaching the microscopic scale. In glasses the structural disorder undermines this approximation in a subtle way, still not completely clarified.

Using molecular dynamics simulations of a model monoatomic glass of very large size, we show that the breakdown of the Debye approximation appears in glasses quite abruptly. It shows up as a significant reduction of the sound velocity with respect to the macroscopic value, on the mesoscopic length-scale of the order of ten interatomic spacings. We also show that this feature allows us to rationalize the ubiquitous excess over the Debye level found in the specific heat of glasses at low temperatures.

***G. Monaco and S. Mossa, Proc. Natl. Acad. Sci. USA \*106\*, 16907 (2009)***

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