75th MSS-Seminar

Wednesday, July. 22nd, 15:30

Nägelsbachstr. 49b

MSS

Cages and super-diffusion in vibrated dense granular media

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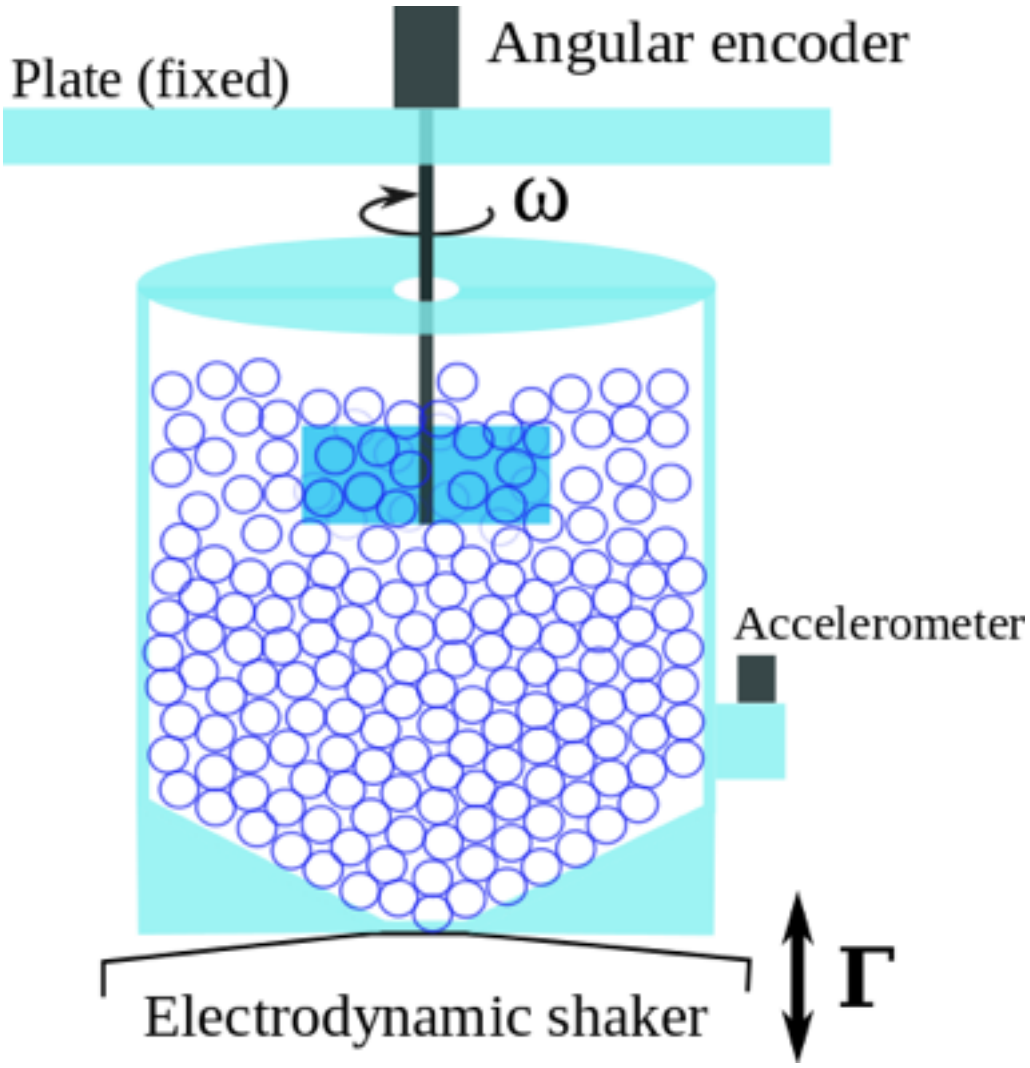

A vertically shaken granular medium hosts a blade rotating around a fixed vertical axis, which acts as a mesorheological probe. At high densities, independently from the shaking intensity, the blade's dynamics show strong caging effects, marked by transient sub-diffusion and a maximum in the velocity power density spectrum (vpds), at a resonant frequency ~10 Hz. Interpreting the data through a diffusing harmonic cage model allows us to retrieve the elastic constant of the granular medium and its collective diffusion coefficient. For high frequencies *f*, a tail ~1/*f* in the vpds reveals non-trivial correlations in the intra-cage micro-dynamics. At very long times (larger than 10s), a super-diffusive behavior emerges, ballistic in the most extreme cases. Consistently, the distribution of slow velocity inversion times τ displays a power-law decay, likely due to persistent collective fluctuations of the host medium.