# The experimental search for 3D Anderson localization of ultrasound in a resonant suspension made of soft metallic micro-beads

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In disordered scattering media, the energy associated with the multiply scattered waves normally follows, on average, a diffusion process (like heat). For strongly scattering media, particularly systems of resonant scatterers, the mean free path can be smaller than the wavelength, near the particle resonances, and the wave energy may remain confined in the vicinity of the source, leading to Anderson localization [1]. This complex wave phenomenon has been unambiguously demonstrated for ultrasound transmitted through 3D elastic networks [2] but the *in situ* search for Anderson Localization is still challenging [3].

Here, we propose to study disordered resonant systems composed of soft metallic micro-beads randomly dispersed into a fluid-like matrix. The softness of these elastic particles is responsible for strong shape resonances that make the diffusivity very low. Anderson localization is thus expected. Moreover, the fluid structure of these "resonant suspensions" should allow measurements inside the sample to evidence Anderson localization as position-dependent diffusion [4].

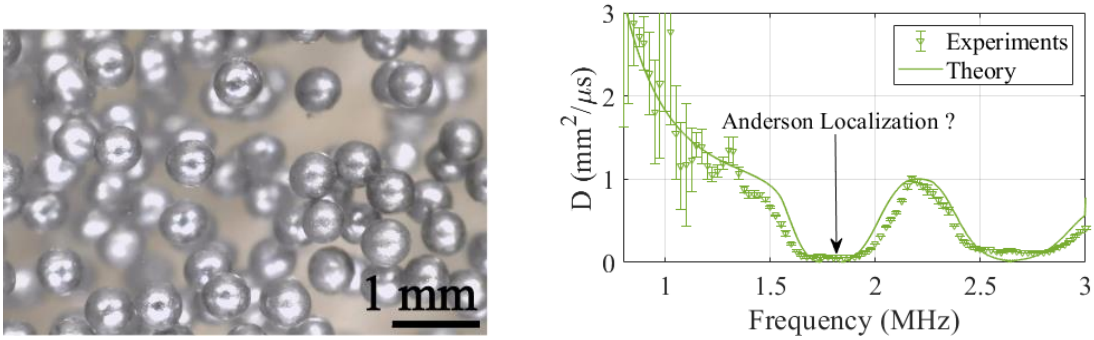


Figure: (left) soft metallic micro-beads suspended in yield-stress fluid (right) measured and calculated diffusion coefficients versus frequency.

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