Search for 3D Anderson localization of ultrasound in resonant emulsion

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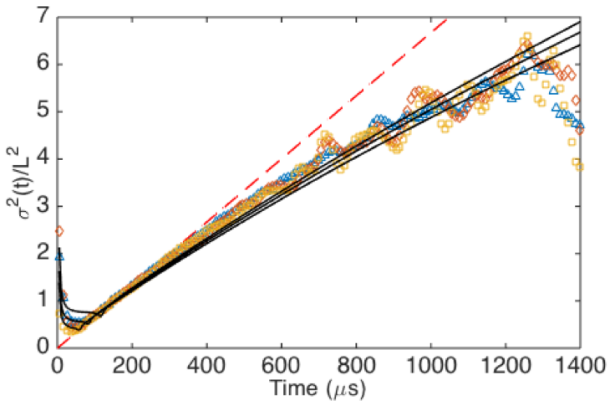

Transverse confinement measurements

In scattering media, the coherent part of waves loses its energy after one scattering mean free path, but, in the absence of dissipation, this energy remains in the system and is scattered in all directions. The energy associated with the resulting incoherent field normally follows, on average, a diffusion process (like heat). For strongly scattering media, the mean free path can be smaller than the wavelength and the wave energy may remain confined in the vicinity of the source, leading to Anderson localization[1]. The search for the experimental observation of this complex wave phenomenon is still challenging in three-dimensional (3D) disordered samples, especially for light[2]. On the other hand, Anderson localization has been unambiguously demonstrated for ultrasound in 3D elastic networks[3]. Here, we propose to investigate Anderson localization within systems composed of resonant liquid droplets randomly dispersed into a fluid-like matrix. These "resonant emulsions" present some advantages since they have extremely low absorption for ultrasound, which can be a crucial point for an unambiguous interpretation of Anderson localization experiments[4]. In addition, their all-fluid structure allows for an *in situ* investigation of the acoustic field at any position inside the sample.

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