

**Irfu**Institut de recherche  
sur les lois fondamentales  
de l'Univers**Séminaire  
DPhP****Lundi 25/11/2019, 11h00**

CEA-Saclay Bât. 141, salle André Berthelot

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## The hidden landscape of wave localization in disordered or complex structures

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Standing waves in disordered or complex systems can be subject to a strange and intriguing phenomenon which has puzzled the physics and mathematical communities for more than 60 years, namely wave localization. This phenomenon consists of a concentration (or a focusing) of the wave energy in a very restricted sub-region of the entire domain. It has been evidenced experimentally in mechanics, in acoustics, and in quantum physics. Determining the conditions for the onset of localization, depending on the disorder amplitude, the energy, or the wave type, is the aim of many theoretical studies. We will present a theory that unifies different types of localization within a single mathematical framework. To that end, we will introduce the notion of "localization landscape", solution to a Dirichlet problem associated to the wave equation. Going further, the landscape also defines an "effective localization potential", providing a new insight into the confinement of the waves in disordered media. This potential allows us to predict the localization region, the energies of the localized modes, the density of states, and the long range decay of the wave functions. We will present experimental and numerical examples of this theory in mechanics, in semiconductor physics, and in molecular systems, as well as theoretical perspectives with cold atom systems.

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Le café sera servi 10 minutes avant.

NB : La présentation d'une pièce d'identité est exigée à l'entrée du centre. Tous les auditeurs extérieurs sont priés de prévenir à l'avance Martine Oger, tél. 01 69 08 23 50, e-mail : [martine.oger@cea.fr](mailto:martine.oger@cea.fr). (délai de 7 jours).