A few surprises in multiple scattering of light from disordered media
Rémi Carminati, ESPCI Paris

In this talk we will review recent results in the theory of light transport (diffusion) and scattering (speckles) that predict unexpected behaviors of interest for the control of light matter-interaction. We will discuss an invariance property of the average path length in a wave diffusion process, and the first measurement demonstrating this invariance. In the study of speckle patterns, we will show that a spatial correlation between the reflected and transmitted intensities persists even in the multiple scattering regime. This makes possible to quantify the mutual information between transmitted and reflected speckles. We will finally address the influence of correlations in the disorder on the scattering strength. In the case of hyperuniform materials (a specific class of correlated materials), we will show that disordered materials that are both dense and transparent can be designed.