Exploiting Multiple Scattering of Waves in Random Media

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In this talk we describe our experimental work in the measurment of phase-coherent multiple scattering of waves in random media. We use a wide variety of non-contacting optical, millimeter wave and ultrasonic techniques to probe natural random media (such as rocks) as well as artificial systems. By using non-contacting methods we can record dense, high-fidelity data sets which sample the random fluctuations of the media. By carefully measuring the phase of these waves as well as their amplitude, we can exploit mesoscale fluctuations to achieve resolution beyond diffusion and radiative transfer, which neglect this phase information.