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**Ultracold Atoms in Disorder: 3D Anderson Localization
and Coherent Backscattering**

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Abstract:

Phase coherence has dramatic effects on the transport properties of waves in random media, leading eventually to a complete halt of the wave, *i.e.* Anderson localization. For weak disorder, a first order manifestation of coherence is the phenomenon of coherent backscattering (CBS), *i.e.* the enhancement of the scattering probability in the backward direction. Here I will report on our recent observations of both 3D Anderson localization and CBS of ultracold atoms in a laser speckle potential. In particular, the latter observation, which constitutes the first direct signature of phase coherence in ultracold disordered gases, could be used to give unambiguous signatures of the onset of Anderson localization. Altogether, these results pave the way towards the precise investigation of the Anderson transition in 3D.