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**Svitlana Mayboroda\*** ([svitlana@umn.edu](mailto:svitlana@umn.edu)), 206 Church st SE, Minneapolis, MN 55408. *Elliptic PDEs and localization of eigenfunctions in rough media.*

The phenomenon of wave localization permeates acoustics, quantum physics, energy engineering. It was used in the construction of noise abatement walls, LEDs, optical devices. Anderson localization of quantum states of electrons has become one of the prominent subjects in quantum physics, as well as harmonic analysis and probability. However, until recently prediction of specific regions of localization remained largely out of reach.

In this talk I will present recent results revealing a universal mechanism of spatial localization of eigenfunctions of an elliptic operator in a bounded domain. Via a new notion of “landscape” we connect localization to a certain multi-phase free boundary problem, indicate specific location, shapes, and frequencies of localized eigenmodes, and establish regularity (uniform rectifiability) of the emerging subregions. We shall more generally discuss analysis and elliptic equations on uniformly rectifiable sets and closely related solution of the David-Semmes conjecture in geometric measure theory. (Received July 29, 2014)