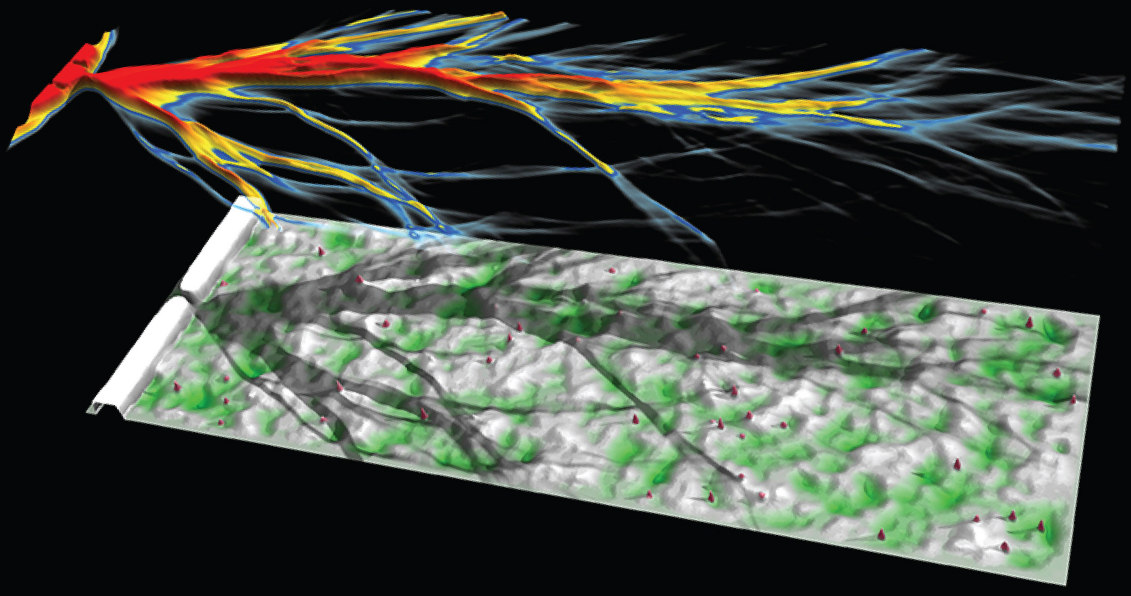
Eric Heller

Argonne NATIONAL LABORATORY

Wave Propagation through Random Media:
Branched Flow from Acoustics to Ocean Waves

Branched flow results from a common situation involving wave or ray propagation through weakly deflecting random media for long path lengths. In nature it affects light waves, radio waves, sound waves, ocean waves, and matter waves in important ways. Its importance is just beginning to be recognized in some of the fields it affects. Branched electron flow in 2DEG semiconductor microstructures has been imaged, and branched flow effects have successfully explained the observed high freak-wave probability in the world's oceans. Interesting theoretical questions involving formation of the branches, wave-ray correspondence, source averaging, and more remain and will be described in this talk, along with the nature and applications of branched flow in the fields mentioned above.



Eric Heller is the Abbott and James Lawrence Professor of Chemistry and Professor of Physics at Harvard University. His research focuses on few-body quantum mechanics, scattering theory, mesoscopic and nano-physics, and quantum chaos. A recurrent theme in Heller's work involves various aspects of the Correspondence Principle and semi-classical approximations in a variety of physical problems, including nonlinear dynamics and chaos theory. Heller is a Fellow of the American Physical Society, the American Academy of Arts and Sciences, and the American Association for the Advancement of Science. He is also a member of the International Academy of Quantum Molecular Science and the National Academy of Sciences.

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