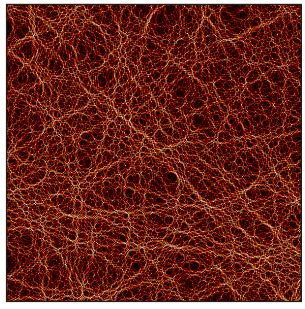
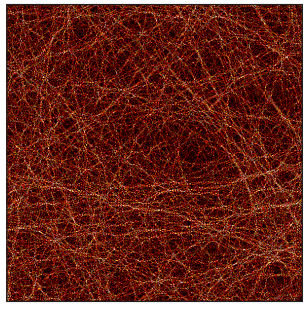
About the Cover

Quantum Chaos

This month's cover accompanies Ze'ev Rudnick's article on quantom chaos. The smaller images illustrate plots of eigenfunctions at progressively higher frequencies for the Dirichlet problem on the curvilinear quadrilateral shown in Rudnick's article. They start from the first and go through the 100,000-th eigenvalue in steps of powers of 10. The background of the cover is a random combination of plane waves, and the point is that in a region giving rise to quantum chaos eigenfunctions of high frequencies are conjectured to be locally similar to such random combinations.



Eigenfunctions of high frequency (cropped from an image on the cover).



Random combination of plane waves. The statistical meaning of the stringy structures in these images does not seem to be well understood (cropped from an image on the cover).

All of the images were produced by Alex Barnett of Dartmouth College, who also provided the data for the figures in Rudnick's article. They were computed using a variant of the Method of Particular Solutions (MPS) called the scaling method, which he has had a hand in developing. It is faster by an order of 10^3 than competing techniques, and is explained in recent papers of his. A good introduction is "Asymptotic rate of quantum ergodicity in chaotic Euclidean billiards", *Comm. Pure Appl. Math.*, 2006.

—Bill Casselman, Graphics Editor
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