1056-60-14 **Richard W Kenyon***, Mathematics Department, Brown University. *Laplacians on vector bundles on graphs.*

The uniform spanning tree (UST) on a graph is a basic model in discrete probability, with connections to loop-erased random walk, determinantal processes and SLE.

The UST on $\mathbb{Z}^2$ has a beautiful conformally invariant scaling limit (limit when the mesh size tends to zero), in which one can find simultaneously a number of different conformally invariant objects, e.g. SLE_2, SLE_8, and the Gaussian free field.

The classical matrix-tree theorem relates the determinant of the combinatorial laplacian on a graph to the number of spanning trees. We generalize this result to laplacians on vector bundles, giving a combinatorial interpretation of their determinants.

This generalization allows us to study spanning trees and forests on not just planar graphs but graphs embedded on surfaces, and in particular to construct scaling limits of spanning trees on Riemann surfaces. (Received September 22, 2009)