1145-05-1991 **Daryl R. DeFod*** (`ddeford@mit.edu`), MIT Stata Center, 32 Vassar St., 32-D475A, Cambridge, MA 02139. *Matched Products and Stirling Numbers of Graphs.*

In this talk I will introduce the *matched product* for graphs, motivated by a popular construction for modeling multiplex networks. The matched product depends on consistent labelings of the nodes in the component graphs and recovers the Cartesian, rooted, and hierarchical products as special cases. I will prove conditions for the product to be planar, Hamiltonian, and Eulerian in terms of the corresponding properties of the component graphs and consider the related problem of computing the probability that a random relabeling of a given graph preserves each property. For example, the number of path labelings whose product is planar is given by the square permutations.

In addition to these traditional graph-theoretic properties, the matched product naturally defines several families of graphs whose Stirling numbers of the first kind can be enumerated in terms of the layer values. We provide explicit examples of these families and provide combinatorial proofs in terms of the Pell numbers. (Received September 24, 2018)