1023-20-27   **Karen Vogtmann***, Department of Mathematics, Cornell University, 555 Malott Hall, Ithaca, NY 14853-4201. *Automorphisms of free groups, outer space, and beyond.*

Outer space was introduced in the mid-1980's as a tool for studying the group $\mathrm{Out}(F_n)$ of outer automorphisms of a finitely- generated free group. The basic philosophy is that one should think of an automorphism of a free group as a topological object, either as a homotopy equivalence of a finite graph or as a diffeomorphism of a suitable three-manifold with free fundamental group. There are compelling analogies between the action of $\mathrm{Out}(F_n)$ on Outer space and the action of an arithmetic group on a homogeneous space or the action of the mapping class group of a surface on the associated Teichmuller space. In this talk I will first describe Outer space and explain how it is used to obtain algebraic information about $\mathrm{Out}\ (F_n)$. I will then indicate how Outer space is related to other areas, from infinite-dimensional Lie algebras to the mathematics of phylogenetic trees, and how ideas from Outer space are currently expanding in new directions. (Received June 15, 2006)