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Danny Calegari* (dannyc@its.caltech.edu), Department of Mathematics, California Institute of Technology, Pasadena, CA 91125. *Stable commutator length in free groups.*

Stable commutator length (scl) answers the question: “what is the simplest surface in a given space with prescribed boundary?” where “simplest” is interpreted in topological terms. This topological definition is complemented by several equivalent definitions - in group theory, as a measure of non-commutativity of a group; and in linear programming, as the solution of a certain linear optimization problem. On the topological side, scl is concerned with questions such as computing the genus of a knot, or finding the simplest 4-manifold that bounds a given 3-manifold. On the linear programming side, scl is measured in terms of certain functions called quasimorphisms, which arise from hyperbolic geometry (negative curvature) and symplectic geometry (causal structures).

I will discuss how scl in free groups is connected to such diverse phenomena as the existence of closed surface subgroups in graphs of groups, rigidity and discreteness of symplectic representations, phase locking for nonlinear oscillators, and the theory of multi-dimensional continued fractions and Klein polyhedra. (Received January 02, 2011)