1096-05-109 **David Mehrle*** (dmehrle@andrew.cmu.edu), Department of Mathematical Sciences, Carnegie Mellon University, Pittsburgh, PA 15213, and **Amy Strosser** (amstrosser@email.msmary.edu), School of Natural Science and Mathematics, Mount St. Mary's University, Emmitsburg, MD 21727. *Community detection in graphs based on a generalization of modularity.*

A *community* within a graph is a highly connected subgraph. Finding communities within large graphs is a topic of practical interest in biology, computing, social sciences, and statistical mechanics. Many techniques for community detection in a large graph G are designed to maximize *modularity*, Q, a measure of the quality of a partition of G into two or more communities. Intuitively, modularity measures the difference in edge density found within communities and the edge density expected in a suitably chosen random model. In this talk, we present a natural generalization of modularity based on the difference between the actual and expected number of walks of length ℓ in the graph, which we call $walk-modularity$, Q_ℓ. We develop a community-detection algorithm designed to maximize Q_ℓ using spectral graph theory. Finally, we apply these algorithms to both synthetic and real-world graphs and find that the results favorably compare against cluster-detection algorithms established in literature. (Received July 30, 2013)