1135-60-1660 **Christine Klymko*** (klymko1@llnl.gov), 7000 East Avenue, Livermore, CA 94550, and **Olivia Simpson** (oliviamsimpson@gmail.com), 345 Park Avenue, San Jose, CA 95110. *Detecting changes in node importance in time evolving networks.* Preliminary report.

One of the most basic questions in network analysis concerns the ranking the importance of nodes in complex networks. Many centrality measures have been for this purpose, however, the majority are meant for use on static (unchanging) networks. In reality most real-world networks are evolving over time. Understanding how a node's importance changes, especially the discovery of large jumps in importance, can illuminate otherwise hidden dynamics. We present a method of detecting changes in node importance relative to a fixed "seed" node in large, time-evolving networks by simulating random walks, factoring in temporal metadata in diverse ways. We show that sampling a sublinear number of random walks in the evolving network is enough to capture a change of specified magnitude that occurs over some duration of time with high probability. (Specifically, we show that for an evolving network on n nodes with a history of length T, $\mathcal{O}(\frac{T}{\tau\delta}\log n)$ random walkers will capture a change of size δ over a period of size τ with high probability). The use of random walks allows our method to be adaptable to large and noisy networks as well as allowing for various interpretations of what level of importance change is meaningful. (Received September 24, 2017)