1125-55-2329 **Ann Sizemore**, **Chad Giusti*** (cgiusti@seas.upenn.edu), **Richard F Betzel** and **Danielle S Bassett**. *Topological structures in human brain networks.*

Encoding brain regions and their connections as a network of nodes and edges captures many of the possible paths along which information can be transmitted as humans process and perform complex behaviors. Here, we investigate both densely connected groups of nodes that could perform local computations as well as larger patterns of interactions that would allow for parallel processing. We detect cliques in the average structural connectomes of 8 healthy adults scanned in triplicate and discover the presence of more high-dimensional cliques than expected in null networks constructed via wiring minimization. This provides architecture through which brain network can perform rapid, local processing. Complementary to theis study of locally dense structures, we locate persistent cycles and study their minimal representatives, which represent structure around which information may flow in either diverging or converging patterns. These cycles exist consistently across subjects, differ from those observed in null model networks, and – importantly – link regions of early and late evolutionary origin in long loops, underscoring their unique role in controlling brain function. (Received September 20, 2016)