

# Modularity of Networks

Fiona Skerman

*Bristol University*

An important problem in network analysis is to identify highly connected components or ‘communities’. Most popular clustering algorithms work by approximately optimising modularity. Given a graph  $G$ , the modularity of a partition of the vertex set measures the extent to which edge density is higher within parts than between parts; and the maximum modularity  $q^*(G)$  of  $G$  is the maximum of the modularity over all vertex partitions of  $G$  and takes a value in the interval  $[0, 1)$  where larger values indicates a more clustered graph. Knowledge of the maximum modularity of random graphs helps determine the significance of a division into communities, a vertex partition, of a real network. We investigate the maximum modularity of Erdős-Rényi random graphs. This is joint work with Colin McDiarmid.