abstract

Members Seminar
Topic:

Speaker:

Affiliation:

Date:

Time/Room:

It is becoming more and more clear that many of the most exciting structures of our world can be described as large networks. The internet is perhaps the foremost example, modeled by different networks (the physical internet, a network of devices; the world wide web, a network of webpages and hyperlinks). Various social networks, several of them created by the internet, are studied by sociologist, historians, epidemiologists, and economists. Huge networks arise in biology (from ecological networks to the brain), physics, and engineering.

These networks pose exciting and challenging problems for the mathematician: they are never completely known, and indeed often not even completely defined. At any time, we can only have partial information about them, through sampling locally, or observing the behavior of some global process.

The approach relates to the theoryof random graphs and randomly growing graphs, and the theory of "Property Testing"in computer science. The methods involve defining a "distance" between two largegraphs, defining when a growing sequence of graphs is convergent, and assigninglimit objects to such sequences.

The limit theory allows us to pose some basic questions in a mathematical way and often answer them. For example, in extremal graph theory: Which inequalities between subgraph densities are valid? Can these be proved using just Cauchy-Schwarz? is there alwaysand extremal graph, and what is the possible structure of these?

The limit theory has been developed by Borgs, Chayes, Lovasz, Sos, Szegedy and Vesztergombi in the dense case, and by Aldous, Benjamini, Schramm, Elek and others in the

sparse case.