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Title: Graphs with just the right amount of symmetry

Abstract: Even though almost all graphs have no nontrivial symmetries the literature on graphs which are “very symmetric”, for instance at least vertex-transitive, is very extensive. If one only insists that the graph in question is vertex-transitive, each symmetry of the graph is “welcome”, that is, we do not mind if the graph is “extremely symmetric”. However, sometimes we do not want the graph in question to be too symmetric. Studying and constructing such graphs can be quite a challenge. One of the families of graphs where this situation occurs is that of half-arc-transitive graphs, the investigation of which has been my favorite topic in algebraic graph theory throughout my research career. It is these graphs that I will focus on in this talk.

The main aim of first part of my talk will be to introduce the concept of half-arc-transitive graphs (which are graphs that are vertex- and edge-transitive but not arc-transitive), give some examples and present some of their basic properties. In the second part of the talk I will talk about various recent results on half-arc-transitive graphs, mostly about the ones of the smallest possible valence, namely 4.