Title: Polychromatic Colorings of the Hypercube

Abstract: Given a graph $G$ which is a subgraph of the $n$-dimensional hypercube $Q_n$, an edge coloring of $Q_n$ with $r \geq 2$ colors such that every copy of $G$ contains every color is called $G$-polychromatic. Denote by $p(G)$ the maximum number of colors with which it is possible to $G$-polychromatically color the edges of any hypercube. Originally introduced by Alon, Krech and Szabó in 2007 as a way to prove bounds for Turán type problems on the hypercube, polychromatic colorings have proven to be worthy of study in their own right. This talk will survey what is currently known about polychromatic colorings and introduce some open questions. In particular, we will discuss the best known constructions that give good lower bounds on $p(G)$ for many graphs $G$, and a lemma that follows from Ramsey's Theorem that gives good upper bounds. Exact values for $p(Q_d)$ are known for all $d$, but there are many graphs $G$ for which $p(G)$ cannot be determined using current techniques. In addition, there are many related open problems. For example, it is not known whether for all $r$ there is a graph $G$ such that $p(G) = r$. In addition there are some natural generalizations and variations of the problem that are only partially understood, and a number of questions about the relationship of polychromatic numbers to Turán type problems on the hypercube.