The minimum number of monochromatic 4-term progressions

Date Tuesday, October 6

Time 3 pm

Location 303 Mudd

Abstract: It is not difficult to see that whenever you 2-color the elements of $\mathbb{Z}/p\mathbb{Z}$, the number of monochromatic 3-term arithmetic progressions depends only on the density of the color classes. The analogous statement for 4-term progressions is false. We shall analyse the reasons for this, and subsequently derive bounds on the minimum number of monochromatic 4-term arithmetic progressions in any 2-coloring of $\mathbb{Z}/p\mathbb{Z}$. In the process we touch upon the subject of quadratic Fourier analysis as well as a closely related question in graph theory studied by Thomason et al.: What is the minimum number of monochromatic $K_4$s in any 2-coloring of $K_n$?