

**Talk Title:** A polynomial sieve: beyond separation of variables

**Abstract:** Many problems in number theory can be framed as questions about counting solutions to a Diophantine equation (say, within a certain “box”). If there are very few, or very many variables, certain methods gain an advantage, but sometimes there is extra structure that can be exploited as well. For example: let  $f$  be a given polynomial with integer coefficients in  $n$  variables. How many values of  $f$  are a perfect square? A perfect cube? Or, more generally, a value of a different polynomial of interest, say  $g(y)$ ? These questions arise in a variety of specific applications, and also in the context of a general conjecture of Serre on counting points in thin sets. We will describe how sieve methods can exploit this type of structure, and explain how a new polynomial sieve method allows greater flexibility, so that the variables in the polynomials  $f$  and  $g$  can “mix.” This is joint work with Dante Bonolis.