abstract

ARITHMETIC HOMOGENEOUS SPACES
Topic:

Speaker:

Affiliation:

Date:

Time/Room:

I will describe recent joint work with Janos Pintz and Cem Yildirim on small gaps between primes and primes in tuples. Perhaps the most surprising result is that if the primes have level of distributed in arithmetic progressions greater than 1/2 then one can prove there are infinitely often bounded gaps between primes. Since the Bombieri-Vinogradov theorem implies the primes have level of distribution 1/2, this is just beyond what can be proved unconditionally. If the primes have level of distribution 1 (the Elliott-Halberstam conjecture) then there are infinitely many pairs of primes with difference 16 or less. Unconditionally we can prove that there are pairs of primes much closer together than the average distance between consecutive primes. There are many important questions we have not been able answer. Can one obtain bounded gaps between primes unconditionally by this method? The method is very good at detecting two primes close together, but it fails to detect three or more primes close together. Is this inherent in the method or not?

While this work had its origin in the circle method as developed for small gaps between primes by Hardy-Littlewood, Rankin, and Bombieri-Davenport, the final method is closely connected to work in 1950 by Selberg on almost prime pairs, and its generalization by Heath-Brown in 1997 to almost prime tuples. How this work relates to sieve theory is another area of interest.