1176-05-123 **Robert G Fraser*** (robert.fraser@wichita.edu). *Three-term arithmetic progressions in subsets of $\mathbb{F}_p^\infty$ of large Fourier dimension.*

A classical result of Klaus Roth states that, for any $\epsilon > 0$, there exists an $N_0(\epsilon)$ such that if $N \geq N_0$, and if A is a subset of $\mathbb{Z}/N\mathbb{Z}$ or $\{1, 2, \ldots N\}$ containing at least ϵN elements, then A must contain a three-term arithmetic progression.

A Euclidean version of Roth's result was established in 2009 by Łaba and Pramanik. These authors show that if μ is a measure on $\mathbb{R}$ satisfying a technical Fourier decay condition, then the support of μ must contain a three-term arithmetic progression. Surprisingly, a 2017 counterexample of Shmerkin shows that this technical Fourier decay condition cannot be replaced by a Fourier dimension assumption–there is a subset of $\mathbb{R}$ of Fourier dimension 1 not containing a three-term arithmetic progression.

In this talk, we discuss how the 2017 capset result of Ellenberg and Gijswijt can be used to show that, in the locally compact abelian group $\mathbb{F}_p^\infty$, it is in fact true that any set with sufficiently large Fourier dimension must contain a three-term arithmetic progression. (Received January 18, 2022)