The Mathematics Research Center
Beatrice Yormark Distinguished Lecture Series Presents:

Professor Dominique Maldague, UCLA & Cambridge

Thursday, April 16th, 2026, 4:30-5:30 pm – Room 380Y
MRC Distinguished Lecture

Please note there will be a Special Tea preceding this lecture:
3:30 – 4:30 pm, 4th Floor Lounge

Cubic Weyl sums in 2-D from the Fourier restriction perspective

We consider cubic Weyl sums of the form $\sum_{n=N}^{2N} e(x\cdot(n,n^3))$, where x lies in the unit square $[0,1]^2$. It is expected that for many x, such sums exhibit square root cancellation behavior, but this remains far out of reach: the classical argument for quadratic Gauss sums does not adapt to the cubic setting. Even the average L^p behavior of cubic Weyl sums is not fully understood. The current best L^p estimates for variable coefficient sums $\sum_{n=N}^{2N}b_n e(x\cdot(n,n^3))$, where b_n are complex numbers, or the constant coefficient case are due to Hughes-Wooley and Wooley, respectively, using a number theory approach. A major application of the 2016 decoupling theorem of Jean Bourgain, Ciprian Demeter, and Larry Guth was the resolution of the Vinogradov Mean Value conjecture, which in particular yields sharp L^p bounds for cubic Weyl sums in three dimensions. Motivated by recent developments in decoupling and Fourier restriction theory, including the dramatic resolution of the Kakeya set conjecture in R^3 by Hong Wang and Josh Zahl, we develop a new Fourier approach to bounding L^p estimates for 2-D cubic Weyl sums. This is ongoing work that recovers and in some cases generalizes Wooley's results on the constant coefficient problem.