JOSHUA ZAHL, University of British Columbia

The dimension of exceptional parameters for nonlinear projections, and the discretized Elekes-Rónyai theorem.

I will discuss exceptional parameters for nonlinear analogues of the (linear) projection function $\pi_\theta(x, y) = x\cos\theta + y\sin\theta$. A direction θ is called exceptional for a set A if the dimension of the projection $\pi_\theta(A)$ is smaller than the dimension of the projection in a "typical" direction. Results of Kaufman and Bourgain quantify the size of the set of exceptional directions. There are several results concerning nonlinear generalizations of the projection function π_θ. The theme of these results is that under suitable constraints, nonlinear projections are as well-behaved as linear projections, with respect to the size of the set of exceptional "directions." I will discuss a new and unexpected phenomena, which says that in general, nonlinear projections are much better behaved than linear ones. This is joint work with Orit Raz.