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Izabella Laba* (ilaba@math.ubc.ca), Department of Mathematics, University of British Columbia, Vancouver, B.C. V6T 1Z2, Canada. *From harmonic analysis to arithmetic combinatorics.*

We will describe a certain line of research connecting classical harmonic analysis to PDE regularity estimates, an old question in Euclidean geometry, a variety of deep combinatorial problems, recent advances in analytic number theory, and more.

Traditionally, restriction theory is a part of classical Fourier analysis that investigates the relationship between geometric and Fourier-analytic properties of singular measures. It became clear over the years that the theory would have to involve sophisticated geometric and combinatorial input. Two particularly important turning points were Fefferman's work in the 1970s invoking the "Kakeya problem" in this context, and Bourgain's application of Gowers's additive number theory techniques to the Kakeya problem almost 30 years later.

All this led harmonic analysts to explore areas previously foreign to them, such as combinatorial geometry, graph theory, and additive number theory. Although the Kakeya and restriction problems remain stubbornly open, the exchange of knowledge and ideas has led to breathtaking progress in other directions, including the Green-Tao theorem on arithmetic progressions in the primes. The level of interest in the subject has skyrocketed since then, and many exciting developments are sure to follow. (Received September 26, 2006)