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Sharp constants and optimizers for the anisotropic Caffarelli-Kohn-Nirenberg inequalities and related identities

The fundamental Caffarelli-Kohn-Nirenberg (CKN) inequality plays a crucial role in functional analysis, partial differential equations, and geometric measure theory. It was originally studied in the isotropic setting with respect to the Euclidean norm of vectors. When the Euclidean norm is replaced by the Minkowski functional of a convex body (i.e., a compact convex subset of $\mathbb{R}^N$ with nonempty interior), the CKN inequality transforms into its anisotropic counterpart, which remains not fully understood.

In this talk, I will discuss anisotropic CKN identities and their inequalities. In particular, I will present our recent progress on sharp constants, the existence and nonexistence of optimizers for the anisotropic CKN inequalities.