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The Convex Geometry of Inverse Problems

Building on the success of generalizing compressed sensing to matrix completion, this talk discusses progress on further extending the catalog of objects and structures that can be recovered from partial information. I will focus on a suite of data analysis algorithms designed to decompose signals into sums of atomic signals from a simple but not necessarily discrete set. These algorithms are derived in a convex optimization framework that encompasses previous methods based on ℓ_1-norm minimization and nuclear norm minimization for recovering sparse vectors and low-rank matrices. I will discuss general recovery guarantees and implementation schemes for this suite of algorithms and will describe several example classes of atoms and applications.