

# The Phase Retrieval Problem

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In many applications such as X-ray Crystallography, communication, imaging and others one must construct a function/signal from only the magnitude of the measurements. These measurements can be, for example, the Fourier transform of the density function. While it is well known that we can recover a function from its Fourier transform, the classical phase retrieval problem asks whether we can recover a function from only the magnitude of its Fourier transform. The phase retrieval problem has since been extended to a much broader class of settings, referring to the reconstruction of a signal from only the magnitude of its linear measurements or more generally, quadratic measurements. The problem, even in finite dimensions, turns out to be quite challenging. Many fundamental problems remain unresolved. It has surprising links to a many other problems in science and engineering, and to the classical problems on the immersion of projective spaces into Euclidean spaces and nonsingular bilinear forms. In this talk I'll give a brief overview and discuss some of the recent progresses.