The Rayleigh criterion and well-conditionedness of super resolution

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In microscopy applications, numerous definitions of the term "resolution limit" or "diffraction limit" exist. While they have the common reasoning to describe the smallest resolvable distance between two objects, they differ by a constant and lack in a clear definition of what is meant by resolvability. We address this issue by considering super resolution (SR) as the mapping of Fourier coefficients of a discrete measure on $[0, 1)^d$ to its support and weights. In practice, the question of resolvability is then linked to the condition number of this map. The diffraction limit can be seen as an assumption on the separation of the involved measures similar to the Rayleigh criterion. In fact, we can prove that SR is well-conditioned if the Rayleigh criterion holds and this improves a bound on the assumed separation by Chen and Moitra. This is joint work with Stefan Kunis.