Confidence Statements in Deconvolution

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Suppose that we observe data from a deconvolution model, that is, we observe an i.i.d. sample from an unknown distribution under additive noise. In many practical problems the main interest lies not in pointwise reconstruction of the true density but rather in answering qualitative questions, for instance about the number of modes or the regions of increase and decrease.
In this talk, we derive multiscale statistics for deconvolution in order to detect qualitative features of the unknown density. Important examples covered within this framework are to test for local monotonicity or local convexity on all scales simultaneously. We investigate the moderately ill-posed setting, where the Fourier transform of the error density in the deconvolution model is of polynomial decay. Theoretically we derive convergence rates for the distance between the multiscale statistic and a distribution-free approximation and study the power of the constructed tests.
In a second part, we illustrate our method by numerical simulations.
This is joint work with Axel Munk (Goettingen) and Lutz Duembgen (Bern).