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High-dimensional approximation in periodic function spaces

First I will introduce Gevrey spaces $G^{s,c}(\mathbb{T}^d)$, a new family of function spaces on the d-dimensional torus. They are intimately related to the famous Gevrey classes, which were defined by Maurice Gevrey in 1918, who was motivated by applications to PDEs.
Next I will discuss approximation numbers a_n of embeddings of the Gevrey spaces $G^{s,c}(\mathbb{T}^d)$ resp. Sobolev spaces of dominating mixed smoothness $H^r_{\mathrm{mix}}(\mathbb{T}^d)$ into $L_2(\mathbb{T}^d)$. The main focus will be on sharp asymptotic rates, existence of asymptotic constants, d-dependence (as $d \to \infty$), and also on the behaviour in the preasymptotic range $n \leq 2^d$. Clearly, for computational aspects of high-dimensional approximation problems, it is essential to have good bounds for small n, rather than to know 'only' the exact asymptotic as $n \to \infty$.
Finally, if time allows, I will give an interpretation of these results in terms of tractability notions from Information-Based Complexity, where some interesting phenomena occur.

The talk is based on recent joint work with Martin Petersen (Leipzig), Winfried Sickel (Jena) and Tino Ullrich (Chemnitz).