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**Polyanalytic Bergman kernels**

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**ABSTRACT:**

We discuss Hilbert spaces of polyanalytic functions on the complex plane. The norm on these spaces is given by integration against a weight  $e^{-mQ(z)}$  where  $Q$  is a strictly subharmonic function and  $m$  a large positive scaling parameter. We obtain a near-diagonal asymptotic expansion for the reproducing kernels as  $m$  tends to infinity. In the setting of one complex variable, this generalizes the work of Tian-Yau-Catlin-Zelditch from analytic functions to polyanalytic functions.

We also study reproducing kernels of corresponding polynomials spaces. These are spanned by functions  $\bar{z}^r z^j$  where  $0 \leq r \leq q-1$  and  $0 \leq j \leq n-1$ . The inner product is induced by the same weight as before. Keeping  $q$  fixed and letting  $n$  and  $m$  go to infinity, we obtain scaling limits for the kernels in so called bulk regime. In the model case  $Q(z) = |z|^2$ , this investigation has applications in statistical quantum mechanics.

Some of the results are joint work with Håkan Hedenmalm.