COMPLEX ANALYSIS SEMINAR

TOEPLITZ OPERATORS AND OFF DIAGONAL DECAY OF BERGMAN KERNELS

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ABSTRACT: I will present and discuss some results of joint work with Alex Schuster. In the generalized Bargmann-Fock space $H^p(e^{-p\phi})$ of entire holomorphic functions in C^n that are L^p with respect to a weight $e^{-p\phi}$ satisfying $cdd^c|z|^2 < dd^c\phi \leq Cdd^c|z|^2$, one can consider, for a measure m, the operator $T_m f(z) = \int_{C^n} f(x)K(z,x)e^{-2\phi(x)}d\mu(x)$, where K is the Bergman kernel, i.e., the kernel of the orthogonal projection $L^2(e^{-\phi}) \rightarrow H^2(e^{-\phi})$. We showed that $T_m : H^p(e^{-p\phi}) \rightarrow H^p(e^{-p\phi})$ is (well-defined and) bounded if and only if for some $q \geq 1$ the inclusion $H^q(e^{-q\phi}) \rightarrow H^q(e^{-q\phi}dm)$ is bounded. (Such measures m are called Carleson measures, and they have a geometric characterization that showing that the Carleson property is independent of q.) The boundedness of T_m when m is Carleson relies on strong decay properties of the Bergman kernel K established by Christ in the case n=1 and by Delin in all dimensions. In the unit ball there is an analogous notion of weighted Bergman spaces, and though the Bergman kernels of these spaces do decay, they seem to have much worse decay properties; in particular the corresponding results for Toeplitz operators are not known.

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