

# ANALYSIS SEMINAR

## Asymptotics of polynomials orthogonal over the complex unit disk with respect to a positive polynomial weight

### PART II

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**Abstract:** Consider the sequence  $\{p_n(z)\}_{n=0}^{\infty}$  of polynomials of a complex variable  $z$  ( $p_n(z)$  of degree  $n$  and positive leading coefficient) that are orthonormal over the unit disk  $\mathbb{D} := \{z : |z| < 1\}$  with respect to a weight of the form  $|h(z)|^2$ ,  $h(z)$  a polynomial without zeros in  $\mathbb{D}$ , that is, satisfying

$$\int_{\mathbb{D}} p_n(z) \overline{p_m(z)} |h(z)|^2 dx dy = \delta_{n,m}.$$

We establish the behavior of  $p_n(z)$  as  $n \rightarrow \infty$  at every point of the complex plane. We shall also discuss the behavior that these formulas impose on the zeros of the polynomials  $p_n$ . A comparison with similar, known results for polynomials orthogonal over the unit circle will be made, and future research problems/extensions will be discussed.

*Students are welcome.*