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Applications of model-realization theory to inverse problems in free probability

Classically, Nevanlinna showed that there was bijection between positive finite Borel measures on the reals and analytic self-maps of the upper half plane which satisfy an asymptotic condition via the Cauchy transform. More recently, analogous problems have been considered in free probability by various authors. That is, there should be a correspondence between noncommutative probability and function theory on a noncommutative upper half plane. We will discuss how to re-frame recent developments in Agler model-realization theory developed on the upper half plane to completely understand the inverse problem in the free probabilistic context. This talk represents joint work with Benjamin Passer and Ryan Tully-Doyle.