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Ergodic dynamical systems in the study of diffraction

Given a measure, putatively the diffraction of something, how does one create such a something? In this talk we show what a general solution to this problem looks like in the case of pure point diffraction, and what sort of problems it brings with it. The result may be viewed as an elaboration of the classical Halmos - von Neumann theorem on pure point dynamical systems. The results are joint work with Daniel Lenz.