

Operator-valued Haar shifts beyond doubling measures

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In this talk, we present a characterization of the weak type $(1,1)$ inequality for generalized Haar shift operators with noncommuting symbols, adapted to balanced Borel measures that are not necessarily doubling. We also show their extension to bounded operators to the column Hardy space. Our primary technical tool is the noncommutative Calderón--Zygmund decomposition as introduced by Cadilhac, Conde-Alonso and Parcet in 2022. This powerful framework also enables us to extend the noncommutative paraproducts and martingale transforms in nonregular settings.