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Representations of Noncommutative Cubes and Prisms

Representations of the operator system determined by the canonical generators of the free product of two cyclic groups of order 2 and k, or d cyclic groups of order 2, are studied for the purpose of shedding light on the noncommutative geometry of noncommutative d-cubes and k-prisms. By way of the duality of the categories NCConv and OpSys of noncommutative convex sets and operator systems, respectively, an analysis of noncommutative extreme points, exactness, the lifting property, automatic complete positivity, controlled completely positive extensions, tensor products, and operator system duality is undertaken. Of note is the pairing of two classical dilation theorems of Halmos and Mirman to give a complete description of the noncommutative triangular prism in terms of joint unitary dilations.