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COVARIANT REPRESENTABILITY FOR COVARIANT MULTILINEAR OPERATORS

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ABSTRACT. In this paper the notion of a covariant multilinear map from a C^*-algebra to another is introduced. Covariant completely bounded symmetric multilinear maps are decomposed into covariant completely bounded and completely positive multilinear maps, and each covariant completely bounded map is covariantly representable in terms of covariant representations and bridging operators. We show that a covariant completely bounded multilinear map extends to a completely bounded multilinear map on the crossed product C^*-algebra.

1. Introduction and preliminaries. Christensen and Sinclair [**2**] were the first to formulate the notation of completely bounded (respectively, completely positive) multilinear operators from a C^*-algebra into $\mathcal{B}(\mathcal{H})$ and gave representations for completely bounded multilinear operators. In particular, they introduced the notion of a representable k-linear operator from A^k into $\mathcal{B}(\mathcal{H})$ and pioneered the representability of completely bounded k-linear operators. Paulsen and Smith [**5**] extended a representation of completely bounded multilinear maps to the case of subspaces of C^*-algebras using the correspondence between completely bounded multilinear maps and completely bounded linear maps on Haagerup tensor products.

In Section 2 the notion of a covariant multilinear map from a C^*-algebra to another is introduced. To prove the covariant representation theorem for covariant completely bounded and completely positive multilinear maps, we prove the technical lemmas which are covariant versions of Theorem 2.8 and Lemma 3.1 in [**2**]. In Section 3 we construct the covariant representations of covariant completely bounded symmetric multilinear maps and show that such maps are decomposed

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