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Renormalization of Wick polynomials of locally covariant bosonic vector valued fields

Locally covariant perturbative algebraic quantum field theory (lcpAQFT) is a mathematically rigorous approach to renormalized, perturbatively interacting quantum fields on curved spacetimes. The axioms of local covariance impose strong conditions on possible renormalization schemes for local composite operators, like Wick polynomials. Building on previous work for scalar fields, we fully classify the ambiguity (aka finite renormalization freedom) in the consistent definition of renormalized Wick polynomials of general bosonic vector valued fields. Our results rely on tools from the theory of differential invariants of (pseudo-)Riemannian spaces, and classical invariants of general linear and orthogonal groups.

This is based on the joint work [arXiv:1710.01937] with Alberto Melati and Valter Moretti.