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Local Operator Product Relations for Quantum Field Theory in Curved Spacetime[1] MARK KLEHFOTH, Univ of Chicago — Pointwise products of quantum field operators are not well-defined. Nevertheless, products of field operators evaluated at separate spacetime points are known to satisfy asymptotic relations called operator product expansions (OPEs) in the coincidence limit. Hollands and Wald have argued interacting quantum field theories in curved spacetime are determined by the coefficients appearing in their OPEs. For interacting $\lambda\phi^4$-theory in flat Euclidean spacetime, Holland and Hollands have derived flow equations for all OPE coefficients with respect to the interaction parameter, λ. An obstacle to generalizing their result to curved spacetime is the flow equations involve an integration of OPE coefficients over all spacetime, but OPE coefficients in curved spacetime are only defined in a small neighborhood of the expansion point. Here we consider flow equations for free Klein-Gordon theory, where the mass parameter, m^2, will now be viewed as the interaction parameter. For this theory, the renormalization ambiguities for defining OPE coefficients are well known and tightly constrained. This enables us to determine whether renormalization ambiguities are sufficient to transform the flow equations into local relations which can then be generalized to curved spacetime.

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