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Local and Covariant Flow Relations for OPE Coefficients in Curved Spacetime MARK KLEHFOTH, University of Chicago — In the limit all their points approach one another, the n-point functions of a local quantum field theory may be approximated to arbitrary precision by their so-called operator product expansions (OPEs). The coefficients of these expansions are ordinary c-number distributions which contain a wealth of information about the theory's causal, algebraic, and dynamical structure. In flat Euclidean spacetime, Hollands et al. have derived "flow equations" which govern how OPE coefficients depend on the theory's interaction parameters. These flow equations were rigorously proven to hold order-by-order in perturbation theory, but they remain mathematically well-defined under very general model-independent assumptions and provide a potential avenue for defining the interacting OPE coefficients non-perturbatively. However, there exist serious obstacles to generalizing the Hollands flow equations to curved Lorentzian spacetimes in a manner compatible with locality and covariance. In this talk, I describe these issues and present our resolutions to them for a solvable toy model: Klein-Gordon theory on curved spacetime with the mass viewed as an "interaction parameter". The techniques I describe are expected to apply, more generally, to Lorentzian QFTs with nonlinear interactions.

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