Abstract Submitted
for the APR20 Meeting of
The American Physical Society

Local and Covariant Flow Relations for OPE Coefficients in Curved Spacetime MARK KLEHFOTH, ROBERT WALD, University of Chicago — The n-point functions of (perturbatively-renormalizable) quantum field theories are known to satisfy asymptotic relations called operator product expansions (OPEs) in the limit that all their spacetime points coincide. The coefficients of these expansions are state-independent and contain essential information about the quantum field theory itself. In (flat) Euclidean spacetime, Hollands et al. have derived novel "flow equations" which govern how OPE coefficients depend on the QFT's interaction parameters. Although proven to hold order-by-order in perturbation theory, these flow equations have been proposed as a potential avenue for defining OPE coefficients non-perturbatively. However, serious obstacles arise if one attempts to generalize the Hollands flow equations to curved Lorentzian spacetimes in a local and covariant manner. In this talk, I will describe these issues and sketch our resolutions for a solvable toy model: Klein-Gordon theory on curved spacetime with the (squared) mass, m^2, treated as an "interaction parameter". The strategies I describe for generalizing this toy model's flow relations in a local and covariant way are expected to be applicable, more generally, to QFTs with nonlinear interactions in curved Lorentzian spacetimes.

Mark Klehfoth
University of Chicago

Date submitted: 10 Jan 2020 Electronic form version 1.4