Quantum Field Theory on Low regularity Spacetimes

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In this talk we develop the theory of quantum fields on low regularity curved spacetimes. We follow the algebraic approach as outlined in the book by Bär, Ginoux and Pfäffle suitably adapted to the low regularity setting. In particular we will show how to obtain a unique global $H^2_{loc}(M)$ causal solution to the Cauchy problem for a normally hyperbolic operator on a globally hyperbolic $C^{1,1}$ spacetime. We then show how to construct advanced and retarded Green operators on suitable function spaces and use this to construct the causal propagator G. This is then used to define a symplectic form ω on $H^1_{comp}(M)/Ker(G)$. Finally this is used to construct a representation of the canonical commutation relations on the space of quasi-local C^*-algebras which satisfy the Haag-Kastler axioms. Defining the physical states requires a Sobolev space variant of the micro-local spectrum condition of Radzikowski.