

[Junker, W.](#); [Schrohe, E.](#)

**Adiabatic vacuum states on general spacetime manifolds: Definition, construction, and physical properties.** (English) [Zbl 1038.81052](#)

[Ann. Henri Poincaré](#) 3, No. 6, 1113-1181 (2002).

The – very remarkable – main result of this quite technical work is the extension of the definition of adiabatic states (originally given by Parker for linear quantum fields propagating in Robertson-Walker spacetimes) to general space-times.

In the framework of Hörmander’s microlocal analysis, the central mathematical tool used in this paper to extend the definition of adiabatic vacua consists of the notion of Sobolev wavefront set. It is proved that this notion can be applied to interacting field theories, in close analogy with Hadamard states. It turns out that Hadamard states are a subcase of the class of adiabatic vacuum states. Several properties are analyzed for adiabatic states of Klein-Gordon fields in globally hyperbolic spacetimes: factoriality, quasi-equivalence, local definiteness and Haag duality, giving explicit constructions for the case of a spacetime with compact Cauchy surfaces.

Appendix A provides a short survey of Sobolev technology and it can profitably help the reader in understanding technical parts of the paper.

Reviewer: [Valter Moretti \(Povo\)](#)

**MSC:**

[81T20](#) Quantum field theory on curved space or space-time backgrounds  
[83F05](#) Cosmology  
[35A18](#) Wave front sets in context of PDEs

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**Keywords:**

[Klein-Gordon equation](#); [adiabatic vacua](#); [Sobolev wavefront set](#); [globally hyperbolic spacetime](#); [compact Cauchy surface](#); [Hadamard states](#); [factoriality](#); [quasi-equivalence](#); [local definiteness](#); [Haag duality](#)

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