

Hintz, Peter; Vasy, András

Asymptotics for the wave equation on differential forms on Kerr-de Sitter space. (English)

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Authors' abstract: We study asymptotics for solutions of Maxwell's equations, in fact, of the Hodge-de Rham equation $(d + \delta)u = 0$ without restriction on the form degree, on a geometric class of stationary spacetimes with a warped product type structure (without any symmetry assumptions), which, in particular, include Schwarzschild-de Sitter spaces of all spacetime dimensions $n \geq 4$. We prove that solutions decay exponentially to 0 or to stationary states in every form degree, and give an interpretation of the stationary states in terms of cohomological information of the spacetime. We also study the wave equation on differential forms and, in particular, prove analogous results on Schwarzschild-de Sitter spacetimes. We demonstrate the stability of our analysis and deduce asymptotics and decay for solutions of Maxwell's equations, the Hodge-de Rham equation and the wave equation on differential forms on Kerr-de Sitter spacetimes with small angular momentum.

Reviewer: [Anthony D. Osborne \(Keele\)](#)

MSC:

- [53C50](#) Global differential geometry of Lorentz manifolds, manifolds with indefinite metrics
- [35Q61](#) Maxwell equations
- [83C22](#) Einstein-Maxwell equations
- [58A14](#) Hodge theory in global analysis

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Keywords:

[asymptotic solutions](#); [Maxwell's equations](#); [Hodge-de Rham equation](#); [Schwarzschild-de Sitter spacetimes](#); [stationary states](#); [wave equation on differential forms](#)

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