Fröb, Markus B.; **Higuchi, Atsushi**

Mode-sum construction of the two-point functions for the Stueckelberg vector fields in the Poincaré patch of de Sitter space. (English) Zbl 1294.81135

J. Math. Phys. 55, No. 6, 062301, 21 p. (2014).

Summary: We perform canonical quantization of the Stueckelberg Lagrangian for massive vector fields in the conformally flat patch of de Sitter space in the Bunch-Davies vacuum and find their Wightman two-point functions by the mode-sum method. We discuss the zero-mass limit of these two-point functions and their limits where the Stueckelberg parameter ξ tends to zero or infinity. It is shown that our results reproduce the standard flat-space propagator in the appropriate limit. We also point out that the classic work of *B. Allen* and *T. Jacobson* [Commun. Math. Phys. 103, 669–692 (1986; Zbl 0632.53060)] for the two-point function of the Proca field and a recent work by *N. C. Tsamis* and *R. P. Woodard* [J. Math. Phys. 48, No. 5, 052306, 14 p. (2007; Zbl 1144.81417)] for that of the transverse vector field are two limits of our two-point function, one for $\xi \to \infty$ and the other for $\xi \to 0$. Thus, these two works are consistent with each other, contrary to the claim by the latter authors.

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MSC:

81T20 Quantum field theory on curved space or space-time backgrounds
81T70 Quantization in field theory; cohomological methods
70S05 Lagrangian formalism and Hamiltonian formalism in mechanics of particles and systems
81V22 Unified quantum theories
81R40 Symmetry breaking in quantum theory
83F05 Relativistic cosmology

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Keywords:

Wightman two-point functions

Full Text: DOI arXiv

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