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2.4. An alternative decomposition of (1,2) -- 2.5. The Iwasawa decomposition of (1,2) -- 2.6. The Hannabuss decomposition of (1,2) -- 2.7. Homogeneous spaces, cosets and orbits -- 2.8. The complex Lorentz group -- Chapter 3. Induced representations for the Lorentz group -- 3.1. Integration on homogeneous spaces -- 3.2. Induced representations -- 3.3. Reducible representations on the light-cone -- 3.4. Unitary irreducible representations on a circle lying on the lightcone -- 3.5. Intertwiners -- 3.6. The time reflection -- 3.7. Unitary irreducible representations on two mass shells -- Chapter 4. Harmonic analysis on the hyperboloid -- 4.1. Plane waves -- 4.2. The Fourier-Helgason transformation -- 4.3. The Plancherel theorem on the hyperboloid -- 4.4. Unitary irreducible representations on de Sitter space -- 4.5. The Euclidean one-particle Hilbert space over the sphere -- 4.6. Unitary irreducible representations on the time-zero circle -- 4.7. Reflection positivity: From (3) to (1,2) -- 4.8. Time-symmetric and time-antisymmetric test-functions -- 4.9. Fock space -- Part 2. Free quantum fields -- Chapter 5. Classical field theory -- 5.1. The classical equations of motion -- 5.2. Conservation laws -- 5.3. The covariant classical dynamical system -- 5.4. The restriction of the KG equation to a (double) wedge -- 5.5. The canonical classical dynamical system.
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Sommario/riassunto

"In 1975 Figari, Høegh-Krohn and Nappi constructed the P(Phi)2 model on the de Sitter space. Here we complement their work with new results, which connect this model to various areas of mathematics. In particular, i.) we discuss the causal structure of de Sitter space and the induces representations of the Lorentz group. We show that the UIRs of SO0(1, 2) for both the principal and the complementary series can be formulated on Hilbert spaces whose functions are supported on a Cauchy surface. We describe the free classical dynamical system in both its covariant and canonical form, and present the associated quantum one-particle KMS structures in the sense of Kay (1985). Furthermore, we discuss the localisation properties of one-particle wave functions and how these properties are inherited by the algebras of local

observables. ii.) we describe the relations between the modular objects (in the sense of Tomita-Takesaki theory) associated to wedge algebras and the representations of the Lorentz group. We connect the representations of SO(1,2) to unitary representations of SO(3) on the Euclidean sphere, and discuss how the P(Phi)2 interaction can be represented by a rotation invariant vector in the Euclidean Fock space. We present a novel Osterwalder-Schrader reconstruction theorem, which shows that physical infrared problems are absent on de Sitter space. As shown in Figari, Hoegh-Krohn, and Nappi (1975), the ultraviolet problems are resolved just like on flat Minkowski space. We state the Haag-Kastler axioms for the P(Phi)2 model and we explain how the generators of the boosts and the rotations for the interacting quantum field theory arise from the stress-energy tensor. Finally, we show that the interacting quantum fields satisfy the equations of motion in their covariant form. In summary, we argue that the de Sitter P(Phi)2 model is the simplest and most explicit relativistic quantum field theory, which satisfies basic expectations, like covariance, particle creation, stability and finite speed of propagation"--