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High Energy Physics - Theory

Imaginary-Scaling versus Indefinite-Metric Quantization of the Pais-Uhlenbeck Oscillator

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(Submitted on 10 Jul 2011 (v1), last revised 9 Dec 2011 (this version, v4))

Using the Pais-Uhlenbeck Oscillator as a toy model, we outline a consistent alternative to the indefinite-metric quantization scheme that does not violate unitarity. We describe the basic mathematical structure of this method by giving an explicit construction of the Hilbert space of state vectors and the corresponding creation and annihilation operators. The latter satisfy the usual bosonic commutation relation and differ from those of the indefinite-metric theories by a sign in the definition of the creation operator. This change of sign achieves a definitization of the indefinite-metric that gives life to the ghost states without changing their contribution to the energy spectrum.

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