

The logarithmic phase singularity in the inverted harmonic oscillator

Freyja Ullinger^{1,2}, Matthias Zimmermann¹, and Wolfgang P Schleich²

¹*German Aerospace Center (DLR), Institute of Quantum Technologies,
Wilhelm-Runge-Straße 10, 89081 Ulm, Germany*

²*Institut für Quantenphysik and Center for Integrated Quantum Science and Technology
(IQST), Universität Ulm, Albert-Einstein-Allee 11, 89081 Ulm, Germany*

Phenomena in quantum field theory, such as Hawking radiation [1] or acceleration radiation [2], or based on a logarithmic phase singularity at an event horizon in spacetime.

In this contribution, we show that related effects emerge in the elementary quantum system of a one-dimensional inverted harmonic oscillator. In fact, the Wigner function corresponding to an energy eigenfunction of this system [3,4] clearly displays a horizon in phase space. Although usually hidden, even a logarithmic phase singularity in combination with an amplitude singularity appears after a suitable coordinate transformation.

Our insights [5] into this simple quantum system lay the foundation for future applications in the field of matter wave optics.

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