OPERATORS IN KAHLER SPACES AND QUANTUM MECHANICS

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The mathematical foundation of quantum mechanics, as established by von Neumann, relies on the theory of operators in complex Hilbert spaces, where complex numbers play a central role. However, the necessity of complex numbers in this framework remains debated.

This talk explores a recent approach [1] that redefines quantum mechanics as a theory of operators in a real Kahler space, with a focus on spectral theory in such spaces. The Kahler-space framework retains all essential features of quantum theory while introducing a critical advantage: it naturally embeds a Hamiltonian symplectic structure, akin to classical mechanics. This structural parallelism unifies the geometric description of classical and quantum dynamics. Furthermore, we demonstrate that the ergodicity of finite-dimensional quantum systems emerges explicitly within this framework, offering new insights into their dynamical behavior.

References

1. I. Volovich, *Real Quantum Mechanics in a Kahler Space*, arXiv:2504.16838.

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