q-complex numbers, a natural consequence of umbral calculus

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The q-umbral calculus presented at OPSFA in Munich 2005 finds its natural continuation in the q-holomorphic functions, which have q-complex numbers as function argument. These q-complex numbers give a natural explanation of the Heisenberg uncertainty relation, since meromorphic continuation can be done in a stochastic way. Another aspect is the observed increase in convergence radius for certain functions. The concept of infinity plays a fundamental role here, as well as the logarithmic concept, which gives a nice recemblance to ancient hypergeometric formulas. The discrete conception of nature follow in the same vein as previous works by Boltzmann, Weyl, and Hilbert.

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References and Literature for Further Reading

[1] L. Boltzmann, Über die Unentbehrlichkeit der Atomistik in der Naturwissenschaft , *Wien. Ber.* 105 (1896) 907-922.

[2] T. Ernst, *q-Bernoulli and q-Euler polynomials, an umbral approach*
Int. J. Difference Equ. 1 (2006) No. 1, 31-80.

[3] D. Hilbert, Über das Unendliche, *Math. Ann.* 95 (1925) 161-190.

[4] G.C. Rota, B.D. Taylor, The classical umbral calculus, *SIAM J. Math. Anal.* **25** (1994) 2, 694-711.

[5] H. Weyl,*Das Kontinuum, Kritische Untersuchungen über die Grundlagen der Analysis*, Leipzig, (1918)