

Quadratic and Quartic Variations of the Schrödinger Particle in a Box

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The self-similarity properties of the solution (wave function) of the Cauchy initial value problem for Schrödinger equation of a free particle with the periodic initial data will be discussed. If the initial data is of the class BV on the period then the wave function is of bounded weak quadratic variation in the space variable, and of bounded weak quartic variation as a function of time. These results cannot be improved neither globally, nor locally, their essence is number-theoretical (Gauss' sums, complete and incomplete, Fresnel integrals).