Physikalisches Institut
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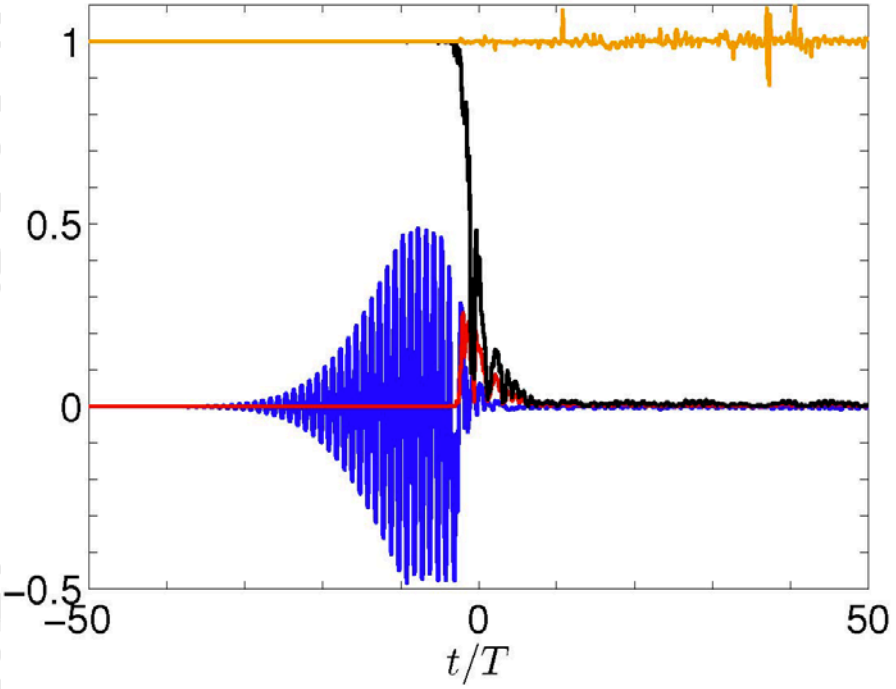
Albert-Ludwigs-Universität Freiburg

PHYSIKALISCHES KOLLOQUIUM

AM 26. OKTOBER 2015 UM 17 UHR C.T.

IM GROßEN HÖRSAAL



EMERGENCE AND DESTRUCTION OF MACROSCOPIC WAVE FUNCTIONS

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The concept of the macroscopic wave function is a key for understanding macroscopic quantum phenomena. The existence of this object reflects a certain order, as is present in a Bose-Einstein condensate when a single-particle orbital is occupied by a macroscopic number of bosons. In this talk we will discuss the question how this concept can be extended to situations in which a condensate is acted on by an explicitly time-dependent force. While one might assume that such a force would necessarily degrade any pre-existing order, numerical model calculations indicate that macroscopic wave functions can persist even under strong forcing. Particular attention is paid to a construction of the macroscopic wave function, based on the system's actual N-particle wave function, which avoids the customary breaking if the U (1) symmetry associated with particle number conservation, and which relates the existence of time-dependent macroscopic wave functions to "stiffness" of the flow in Fock space. Our simulations also predict the possibility of an almost instantaneous dynamical destruction of a macroscopic wave function under currently accessible experimental conditions.