Physikalisches Institut
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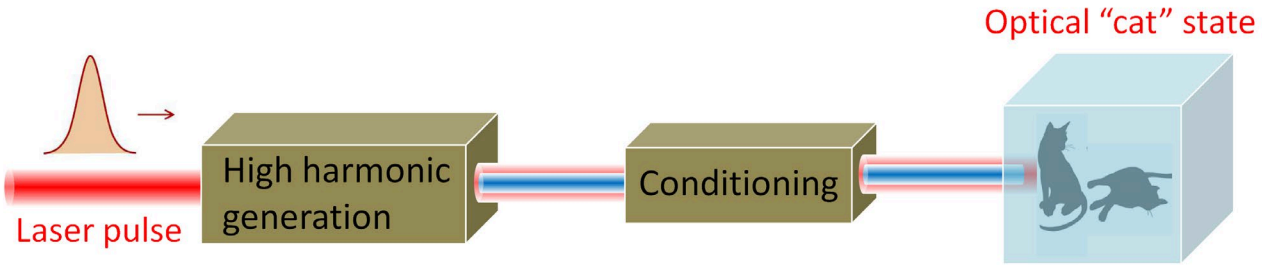
PHYSIKALISCHES KOLLOQUIUM

AM 08. JULI 2024 UM 17 UHR C.T.
IM GROßEN HÖRSAAL



GENERATION OF INTENSE OPTICAL SCHRÖDINGER "CAT" STATES AND APPLICATIONS IN NON-LINEAR OPTICS

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The interaction of matter with intense laser pulses leads to high harmonic generation (HHG), where the low frequency photons of a driving laser field are converted into photons of higher frequencies. This process has been used in numerous fascinating achievements in atomic, molecular and optical physics, and is at the core of attosecond science. Until recently, the process has been successfully described by classical or semi-classical strong-field approximations, treating the electromagnetic field classically and ignoring its quantum nature. In our recent theoretical and experimental investigations, conducted using fully quantized approaches in intense laser-atom interactions, we have shown how quantum operations in the high harmonic generation (HHG) process, can lead to the generation of optical Schrödinger "cat" states and entangled light states with controllable quantum features.

Here, following the introduction of the operational principle of the approach, I will present our recent findings on the nonlinear optics using intense optical "cat" states. These findings mark the initiation of a diverse range of new investigations and developments. We aspire to leverage strongly laser-driven materials for the development of a new class of non-classical and massively entangled states for applications in quantum technologies.