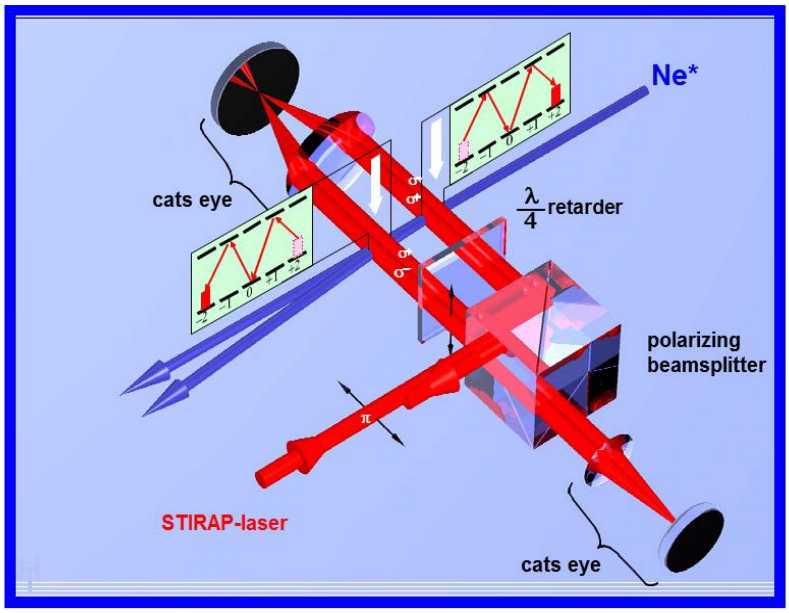
Physikalisches Institut
Fakultät für Mathematik und Physik
Albert-Ludwigs-Universität Freiburg

PHYSIKALISCHES KOLLOQUIUM

AM 10. JULI 2017 UM 17 UHR C.T.

IM HÖRSAAL I, PHYSIKHOCHHAUS



QUANTUM-STATE CONTROL BY INTERFERENCE: THE WONDERS OF STIMULATED RAMAN ADIABATIC PASSAGE (STIRAP) WITH SOME RECENT APPLICATIONS

PROF. DR. KLAAS BERGMANN

DEPARTMENT OF PHYSICS AND OPTIMAS RESEARCH CENTER, TU KAISERSLAUTERN

The STIRAP method for quantum state control (or: “efficient and robust population transfer by design”) is a well-established scheme by now. Initially developed for chemical dynamics studies it has emerged as an essential, sometimes enabling, tool in AMO physics and beyond. In the first part I will present elementary thoughts on the relevance of interference in quantum state control followed by the presentation of elements of the theory behind STIRAP and prominent examples of experiments demonstrating the success of the process. In the second part I will emphasize the wide range of application based on a very small selection from recent applications of STIRAP (in Kaiserslautern or elsewhere), like mirrors for matter waves, population transfer “through the continuum”, preparation of ultra-cold diatomic molecules, or the transfer of light within a set of optical wave guides. The final topic relates to an experiment currently under way at Harvard, involving STIRAP, to improve (reduce) the measured upper limit of the electric dipole moment of the electron. Results of this experiment may have consequences for some aspects of particle physics.

Rev. Mod. Phys. 70, 1003 (1998), J. Chem. Phys. 142, 170901 (2015), Rev. Mod. Phys. 4/2017 (arXiv:1605.00224)