OBSERVATION OF THE SYSTEM $(1)^1\Sigma_u^+$-$(1)^3\Pi_u$ of SR_2 BY FOURIER TRANSFORM SPECTROSCOPY AND ITS ANALYSIS

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Ultracold Sr atoms are presently actively discussed for applications on an optical frequency standard. Thus any influence on the reproducibility and accuracy of the intercombination transitions ${}^1S - {}^3P$ must be thoroughly investigated, and molecular data which involve the atomic singlet and triplet states are of great interest. This motivated us to study the system $(1)^1\Sigma_u^+$-$(1)^3\Pi_u$ by Fourier transform spectroscopy in high resolution.

Sr_2 is prepared in a heatpipe and fluorescence is excited by different laser sources in a wide spectral range. About 700 levels were measured for which the absolute energies and the rotational quantum numbers are precisely known, applying the detailed data on the ground state of Sr_2 (A. Stein, et al., Eur. Phys. J. D 57, 171 (2010)). Spectra were observed for three isotopologues. The low lying part of the state $(1)^1\Sigma_u^+$ is mainly unperturbed, thus offers the advantage for a unique start of the analysis of the energy range where the two states overlap and the spectra show perturbations by the strong spin-orbit interaction everywhere.

We will report about the present status of observations and analysis, which finally should deliver the diabatic potential curves of both states and their interaction functions. This result will open the doorway from the singlet ground state to the triplet manifold by laser excitation and thus will also be very important for production schemes of ultracold Sr_2, trapped in an optical trap.