Physikalisches Institut
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Albert-Ludwigs-Universität Freiburg

PHYSIKALISCHES KOLLOQUIUM

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IM GROßEN HÖRSAAL

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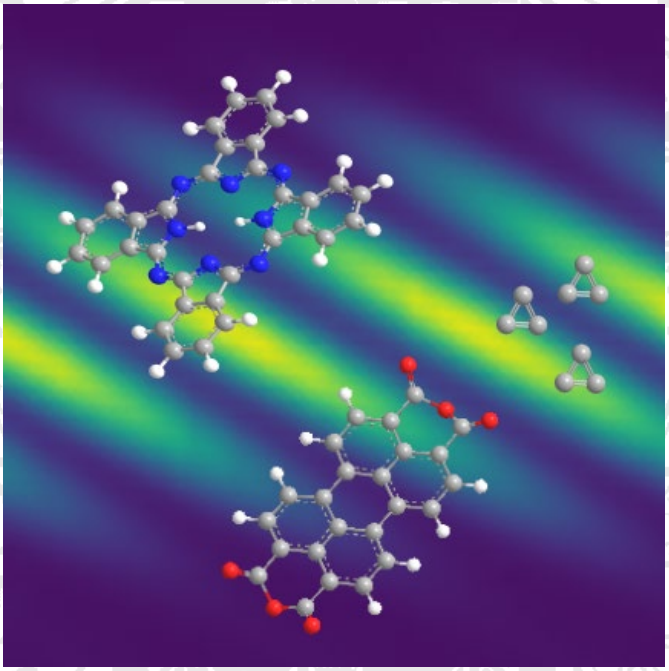

MAPPING MOLECULAR DYNAMICS WITH HIGH TIME-ENERGY RESOLUTION

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The study of molecular dynamics remains a challenge for experimentalists and theorists. The dynamics can be extremely fast, typically covering time scales down to a few femtoseconds (10^{-15} sec). At the same time, molecular processes involve a large number of degrees of freedom (electronic, vibrational, rotational, spin), which are often coupled. This mixture of ultrafast time scales and large parameter space leads to a complex behavior difficult to unravel. In order to disentangle the situation, experiments with high time and energy resolution are needed. I will discuss the possibilities to solve this problem using interferometric spectroscopy methods. These techniques range from the interference of wave packets – similar to a double-slit experiment - up to highly nonlinear and multidimensional experiments. We apply these techniques to small, isolated molecular systems prepared in the gas phase. The minimal environmental perturbation of the molecular targets provides another requirement for achieving high resolution experiments.