

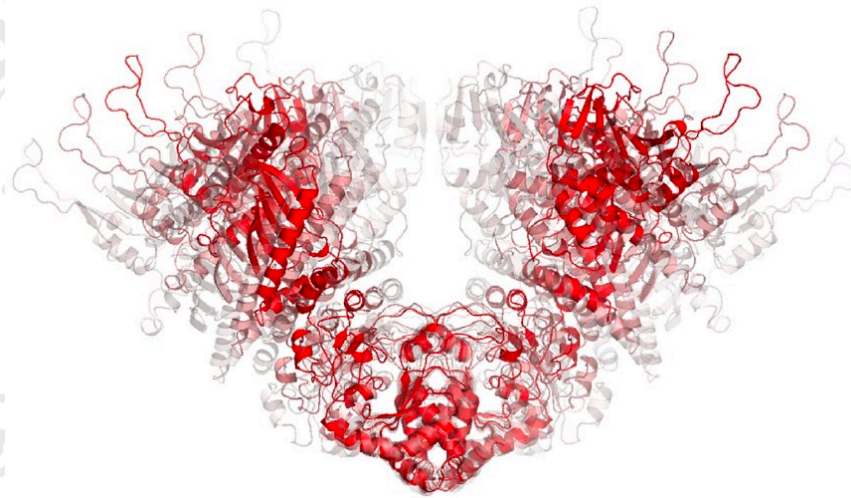
PHYSIKALISCHES KOLLOQUIUM

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IM GROßEN HÖRSAAL

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PHYSICS OF MOLECULAR MACHINES: FLUCTUATIONS AND CONFORMATIONAL DYNAMICS FROM NANoseconds TO DAYS

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Molecular machines are small complex non-equilibrium systems, possibly with some kind of memory. Quantification of the dynamics of such systems in experiments is very challenging, because it occurs on a wide range of time- and length scales.

Here we set out to understand the fluctuations and conformational dynamics in the molecular machine and heat shock protein Hsp90. Therefore, we measure the dynamics of single Hsp90's proteins on time scales from nanoseconds to days with a combination of single-molecule fluorescence, Neutron scattering and Plasmon resonance supported by MD simulations.

I will show that the data on fast timescales can best be described by molecule-spanning dynamics on the 100 ns time scale, which precede larger conformational changes. Then allosteric processes occur via hierarchical dynamics involving slower time scales. Finally, the very good statistic on the slowest conformational dynamics allows us to discuss directionality, Markovianity and ageing in this fascinating ATP fueled molecular machine.