Physikalisches Kolloquium

des Physikalischen Instituts

UNIVERSITÄT BAYREUTH

Triggering molecular processes with light

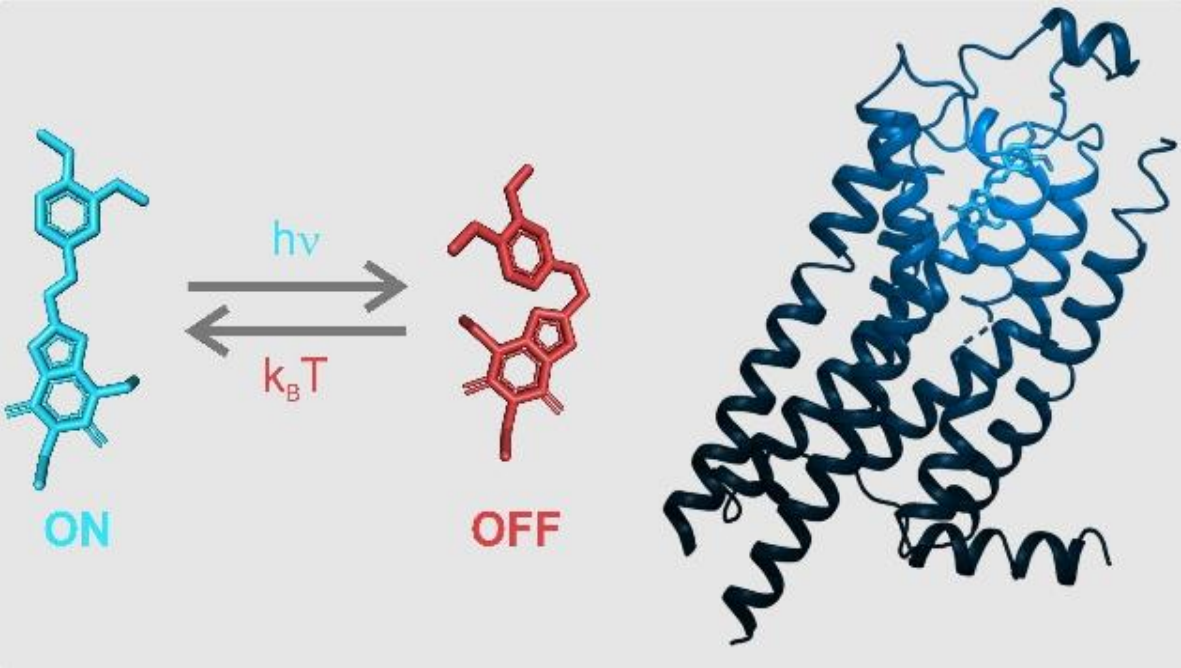
Molecular systems that can be remotely controlled by light are gaining increasing importance in biosciences. High spatial and temporal precision is achievable with short laser pulses via three main approaches for light regulation. Chromoproteins with built in photoswitches like retinals can be directly photoactivated. In the field of optogenetics, genetically encoded light sensitive proteins like channelrhodopsins[1] allow to address the operation of single neurons. Alternatively, one can use photolabile protecting groups to irreversibly trigger processes (uncaging) or photoswitches for reversible switching. Suitably connected to biomolecules, these photoactuators can act as fast triggers for the initiation of conformational transitions.

Together with serial crystallography and quantum chemical simulations we could recently observe the ultrafast structural transformations of azobenzene-based ligands within protein binding sites. These time-resolved snapshots reveal molecular details of ligand-protein interactions and the release of a photoactivated compound from its pharmacological target.[2-4]

My talk will focus on our recent progress in these fields.

[1] E. Bühl, *et al.* (2023) **J. Am. Chem. Soc.** 145, 2182; [2] M. Wranik, *et al.* (2023) **Nat. Commun.** 14, 903; [3] H. Glover, *et al.* (2024) **Nat. Commun.** 15, 10837; [4] T. Saßmannshausen, *et al.* (2024) **J. Am. Chem. Soc.**, 146, 32670

Date: Tuesday, 3rd June 2025 | Time: 5 pm to 6 pm| Room: H15 (NWI)



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