



CHEMISTRY &
BIOCHEMISTRY

DATE TIME LOCATION
05/08/2026 | 10:30am | SSB 170

CHEMISTRY & BIOCHEMISTRY SEMINAR SERIES: Integrated structural dynamics of a vitamin B12-dependent photoreceptor

Abstract:

Photoreceptor proteins use light absorption to elicit a biological response in various processes such as vision, circadian rhythms and plant development. How the initial photochemical events at the receptor's chromophore funnel through space and time into the desired photobiological event is a focus of intense current research.

We focus on the CarH photoreceptor, an archetype of the newly discovered superfamily of B12 dependent photoreceptors that surprisingly repurpose and finely tune the ubiquitous vitamin B12 cofactor to sense light. CarH is a tetrameric light-responding repressor of carotenoid gene expression. Upon light-activation, structural changes lead to disassembly of the tetramer and its release from DNA to allow gene transcription. We combined time-resolved serial femtosecond crystallography at XFELs, time-resolved X-ray solution scattering at a synchrotron and time-resolved cryoEM to study structural changes on the ns to s time-scale that lead from cleavage of the photolabile chromophore bond to tetramer dissociation. Complementing the time-resolved structural studies with results from cryo temperature-controlled X-ray crystallography and in crystallo absorption spectroscopy, from various time-resolved and temperature-controlled spectroscopies and from QM/MM calculations allowed providing and connecting essential pieces in the puzzle of B12 dependent photoreception.

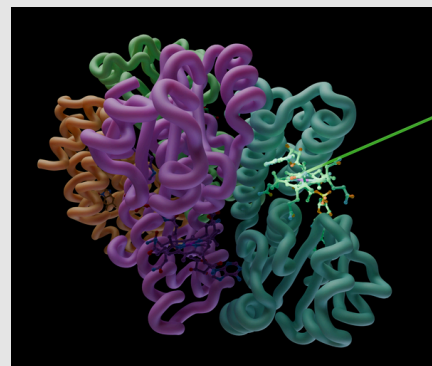
About the Speaker:

Martin Weik is a CEA research director at the Institut de Biologie Structurale in Grenoble, France. He leads the "Structural Protein Dynamics" research team and chairs the "Dynamics and Kinetics of Molecular Processes" group. His work focuses on the dynamics of proteins — how they move and change shape over time — and how these dynamics relate to their function. Light-sensitive proteins (photoreceptors and fluorescent proteins, for example) are studied using a variety of experimental biophysical methods, including time-resolved serial crystallography at X-ray free electron lasers and synchrotrons.

In addition to conducting research, Martin Weik teaches a master course on using X-ray and neutron scattering to study biomolecular structure and dynamics at the University of Parma, Italy. Between March and June 2026, he is a Fulbright-UGA Scholar, hosted by Professor Soichi Wakatsuki in the Department of Structural Biology at Stanford University.



Dr. Martin Weik
Institut de Biologie Structurale



For more info, contact: Michael Thompson, mthompson30@ucmerced.edu