SFB 1078

Protonation Dynamics in Protein Function

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Freie Universität Berlin

**via WebEx**

# Colloquium

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## Far-red light perception by the phytochrome superfamily

Phytochromes and their distant cousins, the cyanobacteriochromes (CBCRs) found in blue-green algae, a.k.a. cyanobacteria, are biliprotein light switches whose signaling function depends on the ambient light quality. Plants, algae, cyanobacteria and anoxygenic photosynthetic prokaryotes use phytochromes to optimize photosynthesis under both low and high light conditions. Notably, plants use phytochromes to detect neighboring plants that compete for the sunlight, triggering increased growth or early flowering in the far-red-enriched shade of neighbors - a phenomenon known as shade avoidance. The widespread distribution of phytochromes in bacteria, fungi and select heterokont algal species implicate an ancient origin for these bilin-based light sensors which also mainly perceive light in the far-red window that is not harvested by green plants. By contrast, CBCRs perceive a much broader wavelength range of light from the near ultraviolet to the near infrared to regulate growth, movement and reproduction of cyanobacteria. Our studies seek to understand how the color detection specificity of phytochromes and cyanobacteriochromes is 'tuned' by the protein matrix. My talk will focus on ongoing studies to understand the molecular basis of spectral tuning within the phytochrome superfamily - with a particular emphasis on the mechanisms underlying far-red light sensing.

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