**Plenary Talk** PV IV Tue 9:45 E 415

**How quantum coherence assists photosynthetic light harvesting** — •Klaus Schulten — Dept. Physics, U. Illinois at Urbana-Champaign, Beckman Institute, Urbana, IL 61801, USA

This lecture examines how hundreds of pigment molecules in purple bacteria cooperate through quantum coherence to achieve remarkable light harvesting efficiency. Quantum coherent sharing of excitation, which modifies excited state energy levels and combines transition dipole moments, enables rapid transfer of excitation over large distances. Purple bacteria exploit the resulting excitation transfer to engage many antenna proteins in light harvesting, thereby increasing the rate of photon absorption and energy conversion. The lecture highlights how quantum coherence comes about and plays a key role in the photosynthetic apparatus of purple bacteria. The apparatus absorbs light and generates a membrane potential that drives many cellular processes energetically. The atomic level structure of the apparatus, which spreads over the entire bacterial cell, has been deduced from crystallography, electron microscopy, atomic force microscopy and computational modeling. The core function is carried out by photosynthetic reaction centers (RCs) that convert electronic excitation energy of pigments through electron transfer into the membrane potential. The RCs are fed electronic excitation energy through light harvesting complexes exhibiting circular geometries adapted to their function of absorbing sun light and transferring its energy among themselves and the RC with little loss. The apparatus might be the first cellular organelle described on the whole at an electronic and atomic level.