## Structure and regulation of biological rotary motors

We are studying the structures of proton translocating ATPases and components of the flagellar motor by X-ray crystallography, electron microscopy and biochemical methods to understand the molecular details und common principles of these biological rotary motors. Proton translocating ATPases are central to biological energy conversion and couple the translocation of protons through membranes to the synthesis or hydrolysis of ATP. F-type ATP synthases use energy stored in transmembrane proton gradients to synthesise the biological energy carrier ATP from ADP and inorganic phosphate. Eukaryotic V-ATPases operate in reverse: They utilise energy derived from ATP hydrolysis to build up transmembrane ion gradients thereby enabling transport processes across membranes. While most eubacterial $H^+$-ATPases are of the F-type, some eubacteria and all known archaea have ATPases of the A-type, which are close homologues of V-ATPases. A-ATPases are simpler in design than their eukaryotic counterparts, but are more versatile in that they can operate in both directions in dependence of their cellular environment. We are using a combination of electron microscopy and X-ray structure analysis to build a pseudo-atomic model of an A-ATPase, which will be presented along with the crystal structure of the torque generating subunit FliG of the bacterial flagellar motor.