FIAS Colloquium

Thursday, February 3, 2011, 14:30
FIAS, Ruth-Moufang-Str. 1, 60438 Frankfurt am Main, Lecture Hall 0.100

Speaker: Dr. José Faraldo-Gómez, Theoretical Molecular Biophysics Group, Max Planck Institute of Biophysics, Frankfurt
Title: Mechanisms of selective ion binding and transport in F1Fo ATP synthases: Insights from quantitative computer simulations

F-ATP synthases are the most prominent ATP source across the living world. These enzymes couple the structural changes required for catalyzing the conversion of ADP and Pi into ATP to the transmembrane flow of Na⁺ or H⁺ ions down their electrochemical gradients. The key, coupling element in these molecular machines is the membrane-embedded Fo rotor, or c-ring. The recent emergence of high-resolution structural data and the close interplay of experimental analyses with advanced, quantitative molecular simulation methods are providing novel and important insights into the mechanisms of these essential proteins. We present an overall summary of our recent progress in this area, particularly pertaining to the mechanism by which ion exchange across the lipid membrane is coupled to the rotation of the c-ring, as well as to the structural basis for the distinct ion-binding selectivity observed for different species. More generally, we believe that the structural and biophysical principles learned through the study of ATP synthases will apply broadly in the context of ion-coupled membrane transport.