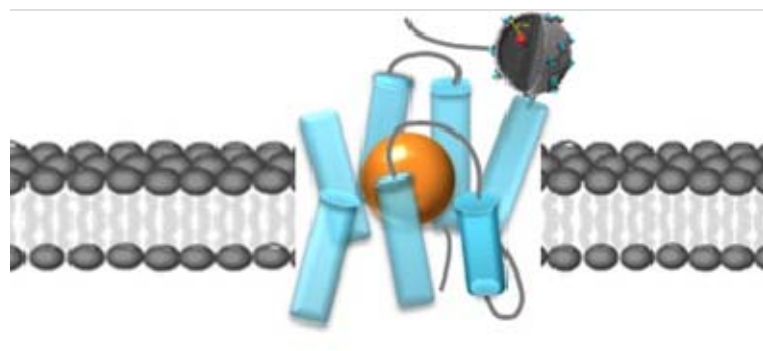


Diamond Quantum Devices and Biology

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Each advancement of sensing technologies make novel natural phenomena accessible to experimental examination. The next sensing frontier is set by the detection of individual electron and nuclear spins in ambient conditions that are starting to become accessible with the help of defect centers in diamond. Indeed, the detection of tiny magnetic fields emanating from small numbers of spins in biological environments holds the promise for a variety of application and opens the quantum frontier in biological systems that may help to unravel the quantum mechanisms underlying biologically important processes such as photosynthesis, magneto-reception of birds or olfaction. In this lecture I will explain which strategies may allow sensing to be achieved in the presence of unavoidable environmental noise and follow this with outlining a variety of new approaches to use this tool to develop new designs for quantum simulators and novel bio-nano quantum devices exploiting the self-assembling capabilities of biological systems. I will outline how this technology may lead to new diagnostic tools and MRI imaging agents and finally outline how such systems may shed light on quantum processes that are of relevance for biological function. The lecture will present both the theory underlying these ideas and first experimental results on our way to achieve these goals.



Receptor activation