



UNIVERSITÀ DI PARMA

Conferment of the title of Honorary Professor
in Applied Physics on

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Lectio Magistralis (abstract)

***Biological Photoreceptors – From Picoseconds to the
Control of Neuronal Activity***

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Biological photoreceptors, due to their function of absorbing and responding to the incident light, exert an outstanding influence on the lifestyle of nearly each and every living organism, including animals, higher and lower plants, fungi, and microorganisms. The function of these chromoproteins is initiated by the photochemical reaction of their incorporated **chromophore** that is later-on transmitted to the protein, and eventually ,translated' into a biological signal that enables the living cell or even the organism to adapt its behavior to the environmental illumination conditions. This principle of action is common to all classes of photoreceptors, however, due to the composition of the various photoreceptors, the signal given to the cell or organism varies. Responses to light absorption are manifold. They extend from image formation and social response in humans and animals over a nearly complete control of the plant life to enzyme activity regulation, gene expression in the DNA to simple movement control in microorganisms.

This presentation will introduce the functional principle of photoreceptors taking those from animals as a model system, and will then present modern **biotechnological and ,optogenetics' applications** based on photoreceptor functions. In particular these applications are gaining exponential scientific interest as **activation of a photoreceptor is** accomplished in a **non-invasive** manner, simply by light. The orthogonal application of more than one class of photoreceptors with different spectral range of absorption allows for outstandingly sophisticated applications.

Prof. Wolfgang Gärtner

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