

Curriculum Vitae
Giuseppe Zucchelli

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- 1982 Italian Laurea in Theoretical Physics at Università degli Studi di Milano, Italy
- 1984 Researcher at Consiglio Nazionale delle Ricerche in the photosynthesis group directed by prof. Giorgio Forti
- 2001 Research Director, CNR-Istituto di Biofisica, Milano

Author of more than 90 publications; Times cited: 1440; h-factor: 22 (Thomson Reuters Web of Science)

Scientific interest and results

Giuseppe Zucchelli is Research Director at the Institute of Biophysics (IBF) of the Consiglio Nazionale delle Ricerche (CNR), Italy. He studies, mainly, problems related to the interaction of light and the photosynthetic apparatus of plants and to excitation energy transfer to the reaction centres, where a charge separation occurs. The experimental approaches mainly used, and applied at different levels of complexity as chlorophyll-protein complexes, thylakoid membranes, containing the entire photosynthetic apparatus, and also leaves, are stationary spectroscopic techniques, absorption, fluorescence and dichroisms spectra as a function of temperature in the range 300-4K, and fluorescence decay measurement with picosecond resolution. The instrumentations have been assembled in the laboratory as well as have been developed the data analysis approaches.

Among the major results in the photosynthetic fields:

- contribution to clarify the absorption heterogeneity of chlorophyll-protein complexes with a demonstration of the presence of the so called chlorophyll spectral forms and analysis of the spectral characteristics of the absorption sub-bands;

- numerical evaluation of the chlorophyll absorption spectrum, in solution and in membranes, in terms of the experimental vibronic frequencies and couplings. Demonstration that temperature modifies the couplings to some vibronic frequencies, probably due to a different Mg coordination.
- Demonstration that all the chlorophyll-protein complexes in photosystem II are nearly isoenergetic and the excitation energy is redistributed among the complexes against the idea of a vectorial excitation energy transport to the reaction centre due to a funnel energy distribution.
- Demonstration that the presence of the external antenna in photosystem II slow down the primary photochemistry.
- Demonstration that in photosystem I, and at physiological temperature, the excitation energy is concentrated in the chlorophyll red forms before to reach the primary acceptor, determining a kinetic limitation. This process has been shown to be thermally activated.
- Direct measurement of the unusual spectral characteristics of the chlorophyll red form with emission at 735nm, present in the external antenna of chl-protein complexes in plant. Its bandwidth is five times broader than that of the usual chlorophyll absorption band due to an intense electron-phonon coupling
- Proposal of the physiological role of the red chlorophyll forms. These chlorophylls enhance the photosystem I absorption cross-section under a canopy.
- Demonstration that chlorophyll tetrapyrrolic ring distortion, due to chlorophyll-protein interaction, modulates the chlorophyll spectral characteristics. This induces an overall absorption broadening due to the chlorophyll spectral forms.
- Calculation, using published crystal data for LHCII, the main external antenna of photosystem II, of the LHCII absorption spectrum in terms of the chlorophyll forms determined by chlorophyll macrocycle distortions.

Giuseppe Zucchelli also contributed in the field of the hypergeometric functions and in the analysis of some Ramanujan's identities.