

## **Quantum Control of Biomolecules using UV Pulse Shaping Techniques**

*Prof. Jean-Pierre Wolf, Biophotonics Group, Group of Applied Physics, Université de Genève, Rue de l'École de Médecine 20, CH- 1211 Genève 4*

The identification and discrimination of molecules that exhibit almost identical structures and spectra using fluorescence spectroscopy is considered quite difficult. In order to evaluate the capability of optimal control for discriminating between the optical emissions of nearly identical molecules, we developed a new approach called “optimal dynamic discrimination (ODD). A proof of principle ODD experiment has been performed using Riboflavin (RBF) and Flavin Mononucleotide (FMN) as model system. We used a complex multipulse control field made of a pair of pulses (shaped UV and ultrashort IR). Clear discrimination was observed for optimally shaped pulses, although the linear spectra from both molecules are virtually identical. A further experiment showed that, by using the optimal pulse shapes that maximize the fluorescence depletion in FMN and RBF in a differential manner, the concentration of both molecules could be retrieved while they were mixed in the same solution. Another application of shaped UV-pulse that is currently investigated is the control of the quantum paths in DNA basis in order to prevent quenching and increase the fluorescence yield.