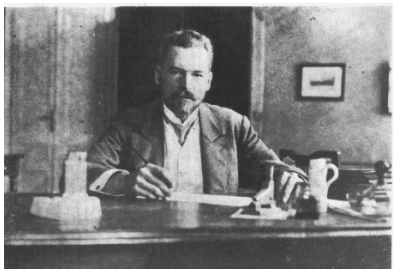

Contribution ID: **8** Type: **Poster**

Light-driven resonance of concentration oscillations in fluorescent proteins

Selective imaging is a challenge in Biology. Out-of-Phase Imaging after Optical Modulation (OPIOM) [1] exploits reversibly photoswitchable fluorophores to selectively detect a target species in the presence of spectrally interfering fluorescent species. The method combines optimized periodic illumination and phase-sensitive detection, which matches the dynamics of the targeted photoreactive protein.

Increasing the complexity of the reaction network improves the multiplexing capacity of the discriminating method, i.e. the number of different objects that can be simultaneously detected. I have investigated a chemical mechanism involving the competition between the complexation of a protein tag and a fluorogen and the photoisomerization of the fluorogen [2]. The kinetics of association between the fluorophore and the protein tag provides discriminating factors for its selective detection. I will explore the multiplexing possibilities offered by coupling the photoisomerization of the fluorogen with the competitive complexation for multiple protein tags.

I will show that for a fluorogen-protein couple the out-of-phase amplitude of the concentration oscillations of the fluorescent complex displays a maximum [3] when the radial frequency ω and the average intensity I^0 of the illumination take singular values which depends on the kinetics of both isomerization and complexation reactions: The maximum is reached for a resonant species which have a particular set of rate constants. Hence, I will show how the experimentalist can tune the control parameters ω and I^0 to optimize the out-of-phase amplitude response for the targeted protein tag only.

[1] J. Querard et al., Nat. Commun. **8**, 1 (2017).
[2] M.-A. Plamont et al., Proc. Natl. Acad. Sci. U.S.A. **113**, 3 (2016).
[3] A. Pellissier-Tanon, R. Chouket, T. Le Saux, L. Jullien, and A. Lemarchand, Phys. Chem. Chem. Phys. **20**, 23998 (2018).

Summary

Primary authors: Ms PELLISSIER-TANON, Agnes (Sorbonne University); Dr LEMARCHAND, Annie (Sorbonne University - CNRS)

Presenter: Ms PELLISSIER-TANON, Agnes (Sorbonne University)

Session Classification: Session 8