

Join us at the Excellence Cluster at Freiburg University!



Please contact
Prof. Dr. Barbara Di Ventura
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PhD position in Optogenetics

Studying NF- κ B signalling in health and disease combining optogenetics and mathematical modelling

The NF- κ B signalling network is highly complex, operative in most cell types, integrating signals from receptors, co-stimulators, and metabolites (e.g. glutamine). In the canonical pathway, the activation of NF- κ B1 depends on the activation of an upstream kinase (IKK), which in turns triggers the degradation of I κ B α , the cytosolic inhibitor of NF- κ B1. As a consequence, NF- κ B1 can enter the nucleus and transcribe its targets, among which I κ B α itself. The fact that NF- κ B1 activates transcription of its own inhibitor establishes a negative feedback loop that leads to NF- κ B1 oscillations. Although much is known about the components of canonical signalling of NF- κ B, its detailed spatio-temporal regulation is not well understood. *This project aims at engineering optogenetic control of NF- κ B1 using different existing approaches based on the blue light sensing LOV2 domain.* The developed opto-NF- κ B1 will then be used in collaboration with the laboratories of Prof. Dr. Bodo Glimbacher (University Hospital) and Prof. Dr. Jens Timmer (Institute of Physics) to understand at the quantitative level how protein dynamics regulate downstream target genes.

YOUR PROFILE

Enthusiastic, highly motivated, team-worker, eager to learn new methods, passionate about science, fan of systems and synthetic biology, proficient in English

Better if...you have experience with molecular cloning, cell culture and fluorescence microscopy

Further reading:

Zhang et al., Cell Systems (2017), NF- κ B Dynamics Discriminate between TNF Doses in Single Cells, Vol. 5, pp: 638-645.

Niopek et al., Nat Commun (2014), Engineering light-inducible nuclear localization signals for precise spatiotemporal control of protein dynamics in living cells. 5:4404. doi: 10.1038/ncomms5404.

Dagliyan et al., Science (2016), Engineering extrinsic disorder to control protein activity in living cells. Vol. 354, pp:1441-1444.

YOU WILL BECOME PART OF THE



Provided you pass the selection

