**PROJECT PROPOSITION - Lab1** (M1, second semester)

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Hosting lab: CBS

Period of proposed project (put **x** instead of ロ) :

ロ Only 1st slot ロ Only 2nd slot

ロ One slot, but I have no preference on which X Both slots (with different groups)

1st slot: thursdays and fridays, from 3/2/2021 to 18/3/2021

2nd slot: thursdays and fridays (except for the last 2 weeks), from 31/3/2021 to 6/5/2021

Rapid prototyping of genetic logic gates

Subject

We have implemented genetic logic gates operated via recombinases that allow cells to respond to external signals according to Boolean Algebra ([Ref1](https://s3-us-west-2.amazonaws.com/oww-files-public/e/e5/Science-2013-Bonnet-599-603.pdf)). However, there are countless possible DNA architectures for implementing the same logic function ([Ref2](https://www.biorxiv.org/content/10.1101/711374v2)), and the workflow to characterize gates in living cells is time consuming. In this project, you will set up and validate a rapid prototyping workflow for genetic logic architectures in linear cell-free systems ([Ref3](https://www.biorxiv.org/content/10.1101/2021.09.07.459228v2)).

Technical tools to be used:

* PCR
* Cell free systems
* Plate reader to measure gate activity via fluorescence intensity.
* Cloning for inserting the gates in a plasmid
* Cytometer to characterize gates in living cells
* Python scripts to design gates architectures ([Ref4](https://www.researchgate.net/figure/Characterization-of-2-input-single-lineage-programs-a-OSIRiS-workflow-A-2-input_fig3_344344211)).

Objectives:

* Select architectures from the gates logic database recombinator ([Ref5](http://recombinator.lirmm.fr/))
* Design DNA sequences corresponding to architectures
* Amplify, and test these architectures in cell-free, using linear DNA
* Validate cell-free measurement in living cells