

Title of Project	Quantitative understanding of the bacterial response to antibiotics in multiple growth conditions
Cell Mechanism Supervisor Name	Meriem El Karoui
Quantitative Supervisor Name	Rosalind Allen (School of Physics)

#### Summary of project

Our society is currently facing an important problem with the rise of multiple antibiotic resistant bacterial strains. As the development of new antibiotics has stalled in recent years, new strategies are urgently needed to supplement current available therapies. This involves increasing the efficiency of already available antibiotics as well as identifying new targets.

A large class of clinically relevant antibiotics induce DNA damage, which ultimately leads to stopping bacterial cells' growth and/or killing them. However, the relationship between the cellular physiology of bacteria and their susceptibility to antibiotics is not yet clearly understood. In particular, while it has been shown recently that susceptibility to antibiotics impairing translation is highly dependent on how fast bacteria grow, this information is unknown for antibiotics that induce DNA damage.

The objective of the project is to characterize experimentally how the susceptibility of *Escherichia coli* cells to various DNA damaging agents depends on their growth rate and other physiological parameters. Measurements will be performed at the population and single cell level using custom microfluidics devices and state of the art quantitative microscopy. The experimental results will be used to inform coarse grained mathematical models of bacterial cell growth under DNA damaging conditions to generate novel hypotheses that will then be tested experimentally.

#### References:

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 Greulich P, Scott M, Evans MR, **Allen RJ**.2015. Mol Syst Biol.