

Undergraduate research projects in the van Teeffelen lab

My lab combines approaches from biology and physics to understand fundamental questions of bacterial cell biology:

- How do bacteria control their own shape and size?
- How do they maintain cell-envelope integrity?
- How is the growth of the cell envelope coordinated with biomass growth?
- How do cells decide when to divide into two?

To that end we combine different tools:

- a) high-resolution single-molecule microscopy, notably single-enzyme tracking and quantitative phase microscopy, a tool to measure single-cell mass in live cells;
- b) molecular biology;
- c) physical modeling.

For more info see our website (vanteeffelenlab.org) and recent publications.

We have various projects for summer and honor students.

For example:

- the generation and test of new fluorescent-protein fusions for single-molecule tracking of enzymes involved in cell-envelope growth [Özbaykal et al. *eLife* 2020; Vigouroux et al. *eLife* 2020]
- the investigation of cell-volume regulation during complex nutrient shifts and upon overexpression/CRISPRi-based depletion of potentially important enzymes using advanced quantitative-phase microscopy and other tools [Oldewurtel et al. *bioRxiv* 2019; Kitahara et al. *bioRxiv* 2021]
- the investigation of the regulation of turgor pressure, an important ingredient for cell-volume regulation.

Projects can be adjusted (to some extent) to the interest and background of the applicant.

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