

## Comparison of DNA-PAINT quantification methods

### Motivation

DNA-PAINT is a super-resolution method that enables the detection and quantification of cellular targets e.g. proteins or nucleotides. It is based on the reversible binding of small DNA strands. The kinetic analysis of this binding process allows inferences in the number of targets. Requirement for quantitative PAINT (qPAINT) is a calibration with a reference structure, thus only the relative numbers of targets can be extracted. In order to quantify absolute target numbers with DNA-PAINT localization-based fluorescence correlation spectroscopy (lbFCS) was developed. lbFCS relies on the analysis of super-resolved fluorescence microscopy data with correlation functions.

### Task Description

In this project your task will be the comparison of the quantification methods qPAINT and lbFCS with a DNA origami as a known groundtruth. First we will optimize analysis parameters for qPAINT. In a second step we will test the lbFCS analysis routine at the same groundtruth. Finally, we will introduce a new quantitative analysis routine for DNA-PAINT based localization distributions. In order to establish this method we will program a small python script and evaluate the routine on the same reference as we used for qPAINT and lbFCS.

### Key References

1. R. Jungmann et al. Quantitative super-resolution imaging with qPAINT. *Nature Methods* 2016. **13** (5): p.429-442
2. Stein, J., et al. *Toward Absolute Molecular Numbers in DNA-PAINT*. *Nano Letters* 2019. **19**, p. 8182-8190
3. Zanicchi, F. C. et al. *A DNA origami platform for quantifying protein copy number in super-resolution*. *Nature Methods* 2017. **14** (8): p. 789

### Work Area

Laboratory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Microscopy	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Data Analysis	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Programming	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Time

#### Possible Start

March 22

#### Duration

8 Weeks

### Contact

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Language