
CellReel Documentation

Release 0.1.0.post7

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CellReel is a graphical user interface for refractive index and fluorescence tomography of biological samples. This is the documentation of CellReel version 0.1.0.post7.

INTRODUCTION

1.1 The Problem

TODO

1.2 Why CellReel?

TODO

1.3 Citing CellReel

If you are using CellReel in a scientific publication, please cite it with:

```
(...) using CellReel version X.X.X (available at  
https://pypi.python.org/pypi/cellreel).
```

or in a bibliography

```
Paul Müller (2021), CellReel version X.X.X: Fluorescence and  
refractive index Tomography [Software]. Available at  
https://pypi.python.org/pypi/cellreel.
```

and replace X.X.X with the version of CellReel that you used.

Furthermore, several ideas implemented in CellReel have been described and published in scientific journals:

- The original paper that employed a prototype of CellReel for combined refractive index and fluorescence tomography [SCG+17].
- Phase retrieval from holographic images with a gaussian filter is implemented according to [SSM+15].
- Phase background image correction with a tilt fitted to a border of the image data was used in [SSM+15] and [SSM+16].
- Phase background image correction with a polynomial fitted to known background regions was introduced for DHM in [CCC+06] (in this reference the phase correction is applied to the hologram data before field reconstruction).

GETTING STARTED

2.1 Installation

- from **PyPI**: `pip install cellreel`
- from **sources**: `pip install -e .` or

CHANGELOG

List of changes in-between CellReel releases.

3.1 version 0.1.1

- ref: implement coolwarm and YlGnBu_r colormaps (drop matplotlib)

3.2 version 0.1.0

- initial release

BILBLIOGRAPHY

INDICES AND TABLES

- genindex
- modindex
- search

BIBLIOGRAPHY

- [CCC+06] T. Colomb, E. Cuche, F. Charrière, J. Kühn, N. Aspert, F. Montfort, P. Marquet, and C. Depeursinge. Automatic procedure for aberration compensation in digital holographic microscopy and applications to specimen shape compensation. *Applied Optics*, 45(5):851, feb 2006. doi:[10.1364/ao.45.000851](https://doi.org/10.1364/ao.45.000851).
- [SCG+17] M. Schürmann, G. Cojoc, S. Girardo, E. Ulbricht, J. Guck, and P. Müller. Three-dimensional correlative single-cell imaging utilizing fluorescence and refractive index tomography. *Journal of Biophotonics*, 11(3):e201700145, aug 2017. doi:[10.1002/jbio.201700145](https://doi.org/10.1002/jbio.201700145).
- [SSM+15] M. Schürmann, J. Scholze, P. Müller, C. J. Chan, A. E. Ekpenyong, K. J. Chalut, and J. Guck. Chapter 9 - Refractive index measurements of single, spherical cells using digital holographic microscopy. In Ewa K Paluch, editor, *Biophysical Methods in Cell Biology*, volume 125 of *Methods in Cell Biology*, pages 143–159. Academic Press, 2015. doi:[10.1016/bs.mcb.2014.10.016](https://doi.org/10.1016/bs.mcb.2014.10.016).
- [SSM+16] M. Schürmann, J. Scholze, P. Müller, J. Guck, and C. J. Chan. Cell nuclei have lower refractive index and mass density than cytoplasm. *Journal of Biophotonics*, 9(10):1068–1076, oct 2016. doi:[10.1002/jbio.201500273](https://doi.org/10.1002/jbio.201500273).