

---

# **BMicro Documentation**

***Release 0.8.0***

**Paul Müller**

**Nov 22, 2022**



## CONTENTS:

<b>1</b>	<b>Getting started</b>	<b>3</b>
1.1	Installation . . . . .	3
1.2	Citing BMicro . . . . .	3
<b>2</b>	<b>Code reference</b>	<b>5</b>
<b>3</b>	<b>Development</b>	<b>7</b>
3.1	Development workflow . . . . .	7
3.2	Documentation . . . . .	7
3.3	Tests . . . . .	8
3.4	Making a new release . . . . .	8
3.5	Continuous integration . . . . .	8
<b>4</b>	<b>Changelog</b>	<b>9</b>
4.1	version ## 0.8.0 - 2022-11-22 . . . . .	11
4.2	version . . . . .	11
4.3	version ### Added . . . . .	11
4.4	version - Implement GUI to restrict peak width #251 . . . . .	11
4.5	version - Make options available in batch calibration #252 . . . . .	11
4.6	version . . . . .	11
4.7	version ### Changed . . . . .	11
4.8	version - Update to Qt version 6.3.2 #249 . . . . .	11
4.9	version . . . . .	11
4.10	version ## 0.7.0 - 2022-09-28 . . . . .	11
4.11	version . . . . .	11
4.12	version ### Added . . . . .	11
4.13	version - Implement 4-peak fitting #244 <a href="https://github.com/BrillouinMicroscopy/bmlab/pull/167">https://github.com/BrillouinMicroscopy/bmlab/pull/167</a> . . . . .	11
4.14	version - Enable spectrum preview for 1D data #247 . . . . .	11
4.15	version . . . . .	11
4.16	version ## 0.6.2 - 2022-09-27 . . . . .	11
4.17	version . . . . .	11
4.18	version ### Added . . . . .	11
4.19	version - Add console logging for dev packages #242 . . . . .	11
4.20	version . . . . .	11
4.21	version ### Fixed . . . . .	11
4.22	version - Show multi-peak fit in spectrum preview as one #245 . . . . .	11
4.23	version - Fix 3D plotting with matplotlib 3.6 #246 . . . . .	11
4.24	version . . . . .	11
4.25	version ## 0.6.1 - 2022-09-16 . . . . .	11
4.26	version . . . . .	11

4.27	version ### Fixed . . . . .	11
4.28	version - Fix spectrum view #241 . . . . .	11
4.29	version . . . . .	11
4.30	version ## 0.6.0 - 2022-09-16 . . . . .	11
4.31	version . . . . .	11
4.32	version ### Added . . . . .	11
4.33	version - Implement exporting 3D data <a href="https://github.com/BrillouinMicroscopy/bmlab/pull/162">https://github.com/BrillouinMicroscopy/bmlab/pull/162</a> . . .	11
4.34	version . . . . .	11
4.35	version ### Changed . . . . .	11
4.36	version - Fit Brillouin spectrum on frequency axis <a href="https://github.com/BrillouinMicroscopy/bmlab/pull/158">https://github.com/BrillouinMicroscopy/bmlab/pull/158</a>	11
4.37	version - Bump bmlab to 0.6.1 #240 . . . . .	11
4.38	version . . . . .	11
4.39	version ### Fixed . . . . .	11
4.40	version - Fix setting axis limits for 1D data #238 . . . . .	11
4.41	version - Fix setting caxis in export dialog #235 . . . . .	11
4.42	version - Fix parameter label in csv files <a href="https://github.com/BrillouinMicroscopy/bmlab/pull/163">https://github.com/BrillouinMicroscopy/bmlab/pull/163</a> . . .	11
4.43	version . . . . .	11
4.44	version ## 0.5.1 - 2022-09-02 . . . . .	11
4.45	version . . . . .	11
4.46	version ### Fixed . . . . .	11
4.47	version - Correctly initialize setup on new file load <a href="https://github.com/BrillouinMicroscopy/bmlab/pull/156">https://github.com/BrillouinMicroscopy/bmlab/pull/156</a>	11
4.48	version - Show correct setup on file load #232 . . . . .	11
4.49	version . . . . .	11
4.50	version ## 0.5.0 - 2022-09-02 . . . . .	11
4.51	version . . . . .	11
4.52	version ### Added . . . . .	11
4.53	version - Allow to account for calibration temperature #212 . . . . .	11
4.54	version - Allow to show image and spectrum #216 #218 #222 #224 . . . . .	11
4.55	version - Show fits in spectrum view #223 #225 #226 . . . . .	11
4.56	version - Implement multi-peak fit batch evaluation #217 #229 . . . . .	11
4.57	version - Export all peaks from multi-peak fits <a href="https://github.com/BrillouinMicroscopy/bmlab/pull/146">https://github.com/BrillouinMicroscopy/bmlab/pull/146</a>	11
4.58	version - Write scale bar to Brillouin Tiff file <a href="https://github.com/BrillouinMicroscopy/bmlab/pull/154">https://github.com/BrillouinMicroscopy/bmlab/pull/154</a> <a href="https://github.com/BrillouinMicroscopy/bmlab/pull/155">https://github.com/BrillouinMicroscopy/bmlab/pull/155</a> . . . . .	11
4.59	version . . . . .	11
4.60	version ### Changed . . . . .	11
4.61	version - Allow to minimaximize the batch evaluation window #228 . . . . .	11
4.62	version - Bump bmlab to 0.5.0 #230 . . . . .	11
4.63	version . . . . .	11
4.64	version ### Fixed . . . . .	11
4.65	version - Don't disable export button #219 . . . . .	11
4.66	version - Properly handle multi-peak fit bounds in evaluation view #220 . . . . .	11
4.67	version - Don't fail batch evaluation for broken repetitions #221 . . . . .	11
4.68	version - Close current file before opening new file #227 . . . . .	11
4.69	version - Fix exporting fluorescence w/o scale calibration <a href="https://github.com/BrillouinMicroscopy/bmlab/pull/145">https://github.com/BrillouinMicroscopy/bmlab/pull/145</a>	11
4.70	version . . . . .	11
4.71	version ## 0.4.0 - 2022-08-17 . . . . .	11
4.72	version . . . . .	11
4.73	version ### Added . . . . .	11
4.74	version - Allow to configure Brillouin export #210 . . . . .	11
4.75	version . . . . .	11
4.76	version ## 0.3.4 - 2022-08-12 . . . . .	11
4.77	version . . . . .	11
4.78	version ### Fixed . . . . .	11
4.79	version - Don't crash if arc is empty #209 . . . . .	11

4.80	version - Fix github actions check pipeline #207	11
4.81	version	11
4.82	version ## 0.3.3 - 2022-07-01	11
4.83	version	11
4.84	version ### Fixed	11
4.85	version - Fix exporting on macOS and linux #206	11
4.86	version	11
4.87	version ## 0.3.2 - 2022-06-30	11
4.88	version	11
4.89	version ### Changed	11
4.90	version - Show BMicro version in about text as well #205	11
4.91	version	11
4.92	version ### Fixed	11
4.93	version - Don't search whole Mac on empty folder name #204	11
4.94	version	11
4.95	version ## 0.3.1 - 2022-06-29	11
4.96	version	11
4.97	version ### Added	11
4.98	version - Add global exception handler #199	11
4.99	version	11
4.100	version ### Changed	11
4.101	version - Remove cron schedule from github actions workflows #202	11
4.102	version	11
4.103	version ### Fixed	11
4.104	version - Don't crash on exporting #197 #201	11
4.105	version	11
4.106	version ## 0.3.0 - 2022-06-29	11
4.107	version	11
4.108	version ### Added	11
4.109	version - Implement batch evaluation #193	11
4.110	version - Add option to export data #189	11
4.111	version - Enable calibrating all calibrations at once #192	11
4.112	version	11
4.113	version ### Changed	11
4.114	version - Bump bmlab to version 0.2.1 #190	11
4.115	version - Show extraction points half transparent #191	11
4.116	version - Code cleanup #194	11
4.117	version	11
4.118	version ### Fixed	11
4.119	version - Fix race condition in case of slow evaluation #184	11
4.120	version - Update preview image on new file load #196	11
4.121	version	11
4.122	version ## 0.2.8 - 2022-05-13	11
4.123	version	11
4.124	version ### Fixed	11
4.125	version - Use correct bmlab version for macOS DMG packages #183	11
4.126	version	11
4.127	version ## 0.2.7 - 2022-05-12	11
4.128	version	11
4.129	version ### Added	11
4.130	version - Properly handle bmlab exceptions #180	11
4.131	version	11
4.132	version ### Fixed	11
4.133	version - Don't crash when switching to multi-peak fit during evaluation #181 #182	11

4.134 version - Fix DMG packages for macOS by locking shapely version #179	11
4.135 version	11
4.136 version ## 0.2.6 - 2022-05-06	11
4.137 version	11
4.138 version ### Added	11
4.139 version - Implement two-peak Brillouin fitting #167 #168	11
4.140 version - Allow to toggle aspect ratio for 2D data #171	11
4.141 version	11
4.142 version ### Fixed	11
4.143 version - Check x-limits before setting to prevent warning #172	11
4.144 version	11
4.145 version ## 0.2.5 - 2022-04-25	11
4.146 version	11
4.147 version ### Added	11
4.148 version - Add calibration options dialog #162	11
4.149 version	11
4.150 version ### Changed	11
4.151 version - Show calibrations in correct temporal order #164	11
4.152 version - Show non-averaged fit for each calibration image #165	11
4.153 version	11
4.154 version ### Fixed	11
4.155 version - Fix small layout glitch in extraction view #161	11
4.156 version	11
4.157 version ## 0.2.4 - 2022-04-12	11
4.158 version	11
4.159 version ### Added	11
4.160 version - Allow to manually set data range #159	11
4.161 version	11
4.162 version ### Changed	11
4.163 version - Make circle-fit half-transparent, show points on top #157	11
4.164 version	11
4.165 version ### Fixed	11
4.166 version - Fix opening broken/empty data sets #156	11
4.167 version - Fix automatic color scale for 2D data #158	11
4.168 version	11
4.169 version ## 0.2.3 - 2022-04-07	11
4.170 version	11
4.171 version ### Fixed	11
4.172 version - Fix showing 2D data #154	11
4.173 version	11
4.174 version ## 0.2.2 - 2022-03-22	11
4.175 version	11
4.176 version ### Changed	11
4.177 version - Code cleanup #145	11
4.178 version	11
4.179 version ### Fixed	11
4.180 version - Bring back multiprocessing support #149	11
4.181 version - Don't open multiple instances on Win when evaluating #147	11
4.182 version - Don't open multiple instances on MacOS with DMG package #140	11
4.183 version	11
4.184 version ## 0.2.1 - 2022-03-21	11
4.185 version	11
4.186 version ### Changed	11
4.187 version - Code cleanup #135 #142	11

4.188 version	11
4.189 version ### Fixed	11
4.190 version - Don't crash when extracted peaks are on a straight line #141	11
4.191 version - Don't crash when trying to evaluate #139	11
4.192 version	11
4.193 version ## 0.2.0 - 2022-03-15	11
4.194 version	11
4.195 version ### Added	11
4.196 version - Implement showing 3D data #128	11
4.197 version - Remember last used folder #132	11
4.198 version	11
4.199 version ### Fixed	11
4.200 version - Fix warning when file could not be opened #129	11
4.201 version - Fix build #131	11
4.202 version	11
4.203 version ## 0.1.6 - 2022-02-18	11
4.204 version	11
4.205 version ### Added	11
4.206 version - Add an about menu #119	11
4.207 version	11
4.208 version ### Changed	11
4.209 version - Update to PyQt6 to support M1 Macs #124	11
4.210 version	11
4.211 version ### Fixed	11
4.212 version - Request minimum required bmlab version #122	11
4.213 version - Pin Shapely to 1.8.0 #120 #121	11
4.214 version	11
4.215 version ## 0.1.5 - 2022-02-16	11
4.216 version	11
4.217 version ### Fixed	11
4.218 version - Adjust release pipeline to properly build and upload release artifacts #118 9347bce74f7bf1fb40ab823967f4be8490af47b9 eb5d7e7d2bcb4cf590e967a01a71d00aefcd3b5	11
4.219 version	11
4.220 version ## 0.1.4 - 2022-02-16	11
4.221 version	11
4.222 version ### Added	11
4.223 version - Add keyboard shortcuts for file actions #117	11
4.224 version - Allow finding peaks in extraction view for all calibrations #111	11
4.225 version - Implement automatic peak finding in calibration view #110	11
4.226 version - Implement automatically finding peaks #99	11
4.227 version - Allow to browse through calibration spectra #89	11
4.228 version - Show selected extraction points in table, allow editing #85	11
4.229 version - Show colorbar with labels in evaluation view #70	11
4.230 version - Automatically load session if it exists #67	11
4.231 version	11
4.232 version ### Changed	11
4.233 version - Add action to exit app #107	11
4.234 version - Deploy with python-3.9 #105	11
4.235 version - Update pyinstaller version #104	11
4.236 version - Require python >= 3.7 #103	11
4.237 version - Add more package requirements #98	11
4.238 version - Suppress mean of empty slice warning #95	11
4.239 version - Suppress useless warning #88	11
4.240 version - Automatically set image shape on orientation change #84	11

4.241	version - Adjust to streamlined bmlab interface #83	11
4.242	version - Adjust to changes in bmlab #82	11
4.243	version - Refactor use of session #81	11
4.244	version - Only check bmlab main branch in workflows #72	11
4.245	version	11
4.246	version ### Fixed	11
4.247	version - Fix rotation labels and make rotations more generic #114	11
4.248	version - Fix matplotlib deprecation warnings #115	11
4.249	version - Fix build on appveyor and for MacOS #116	11
4.250	version - Correctly show evaluation plot after closing a file #102	11
4.251	version - Fix crash when clicking if no file is loaded #101	11
4.252	version - Try to fix slow evaluation plot update #97	11
4.253	version - Recalculate derived values when calibration changes #90	11
4.254	version - Correctly scale the data if the unit is GHz #77	11
4.255	version - Only update necessary tab when switching tabs #76	11
4.256	version - Show measurement of arbitrary dimensionality correctly #74	11
4.257	version - Actually run pytest in checks #73	11
4.258	version	11
4.259	version ## 0.1.3	11
4.260	version	11
4.261	version - setup: use “pytest” command instead of deprecated “setup.py test”	11
4.262	version - ui: add app icon (#9)	11
4.263	version - ui: data tab (#11)	11
4.264	version - build: add Windows and macOS build pipeline (#1)	11
4.265	version	11
4.266	version ## 0.1.2	11
4.267	version	11
4.268	version - CI automation	11
4.269	version	11
4.270	version ## 0.1.1	11
4.271	version	11
4.272	version - Test CI automation	11
4.273	version	11
4.274	version ## 0.1.0	11
4.275	version	11
4.276	version - dummy release	11
<b>5</b>	<b>Bibliography</b>	<b>13</b>
<b>6</b>	<b>Indices and tables</b>	<b>15</b>



This is BMicro, a graphical user interface for Brillouin microscopy data evaluation. This is the documentation of bmlab version 0.8.0.



## GETTING STARTED

### 1.1 Installation

To install BMicro, use one of the following methods:

- **from PyPI:** `pip install bmicro`
- **from sources:** `pip install .`

### 1.2 Citing BMicro

If you use BMicro in a scientific publication, please cite it with:

BMicro developers (2022), BMicro version X.X.X: Python library for the post-measurement analysis of Brillouin microscopy data sets [Software]. Available at <https://github.com/BrillouinMicroscopy/BMicro>.



## CODE REFERENCE

TODO



## DEVELOPMENT

This section gives an overview about everything you need to know if you wish to contribute to [bmlab](#) or [BMicro](#).

### 3.1 Development workflow

We use [GitHub projects](#) to manage the development workflow of [bmlab](#) and [BMicro](#). The main development project board is [Brillouin Evaluation in Python](#).

The development is split into “User Stories”, each of which is a collection of issues (identified via titles in the issues). The current work in progress (WIP) branch is named according to the currently active user story (e.g. *1-smoke-test*). Issues that are not part of the current user story should still be addressed in the current WIP branch.

Once you wish to address an issue, drag it from the “Open” or “Ready” column of the project board to the “In progress” column. Once you finished working on an issue, drag it to the “Done” column, but don’t close it yet (It should be discussed first in the dev meeting).

#### Notes:

- Please write test functions and keep code coverage above 90%.
- Please make sure to always edit the changelog for [BMicro](#) or [bmlab](#).
- Please try to always pull with rebase

```
git pull --rebase
```

instead of

```
git pull
```

to prevent confusions in the commit history.

### 3.2 Documentation

It is always helpful to have code examples and thorough descriptions in a documentation. We use [sphinx-autodoc](#) for the [code reference](#), which means that the docstrings of your functions and classes are automatically rendered. Please make sure that this is working properly - go to the docs directory and execute:

```
pip install -r requirements.txt
sphinx-build . _build
```

This will create a file `_build/index.html` which you can open in your favorite browser. This also applies to [bmlab](#).

## 3.3 Tests

We try to adhere to test-driven development. Please always write test functions for your code. Make sure you have the required packages installed:

```
pip install -r tests/requirements.txt
```

You can run all tests via

```
python -m pytest tests
```

To check for code coverage, make sure the *coverage* Python package is installed and run

```
coverage run --source="bmicro" -m pytest tests
coverage report
```

## 3.4 Making a new release

The release process of BMicro is completely automated. All you need to know is that you have to create an incremental tag:

```
git tag -a "0.1.3"
# or (if you have set up GPG)
git tag -s "0.1.3"
# and finally
git push --tags
```

For more information on how automatic deployment to PyPI works, please read on.

## 3.5 Continuous integration

The following things are automated:

- pytest and flake8 on Linux, macOS, and Windows via GitHub Actions: <https://github.com/BrillouinMicroscopy/BMicro/actions?query=workflow%3AChecks>

You should always check that all checks pass before you merge a pull request (A green state on your local machine does not mean a global green state).

- automatic deployment to PyPI on tag creation via GitHub Actions: <https://github.com/BrillouinMicroscopy/BMicro/actions?query=workflow%3A%22Release+to+PyPI%22>

Paul Müller created the BMicro package on PyPI and gave the user `ci_bm` permission to upload new releases. The password for this user is an [organization secret](#).

- documentation is built automatically (for all tags and for the latest commit to the main branch) on readthedocs: <https://readthedocs.org/projects/BMicro/builds/>
- coverage statistics are done with codecov: <https://codecov.io/gh/BrillouinMicroscopy/BMicro>

Please try stay above 90% coverage.

Badges for all of these CI tasks are in the main `README.rst` file.



## CHANGELOG

List of changes in-between bmlab releases.



**4.1 version ## 0.8.0 - 2022-11-22**

**4.2 version**

**4.3 version ### Added**

**4.4 version - Implement GUI to restrict peak width #251**

**4.5 version - Make options available in batch calibration #252**

**4.6 version**

**4.7 version ### Changed**

**4.8 version - Update to Qt version 6.3.2 #249**

**4.9 version**

**4.10 version ## 0.7.0 - 2022-09-28**

**4.11 version**

**4.12 version ### Added**

**4.13 version - Implement 4-peak fitting #244**  
**<https://github.com/BrillouinMicroscopy/bmlab/pull/167>**

**4.14 version - Enable spectrum preview for 1D data #247**

**4.15 version**

**4.16 version ## 0.6.2 - 2022-09-27**

**4.17 version**

**4.18 version ### Added**

**4.19 version - Add console logging for dev packages #242**

**4.20 version**

---

**4.1. version ## 0.8.0 - 2022-11-22**

**4.21 version ### Fixed**



**BILBLIOGRAPHY**



## INDICES AND TABLES

- `genindex`
- `modindex`
- `search`