EMWSD / Wakis

Electromagnetic and Wake Solver

User Meeting

Meeting #3

Elena de la Fuente on behalf of all contributors

https://github.com/ImpedanCEI

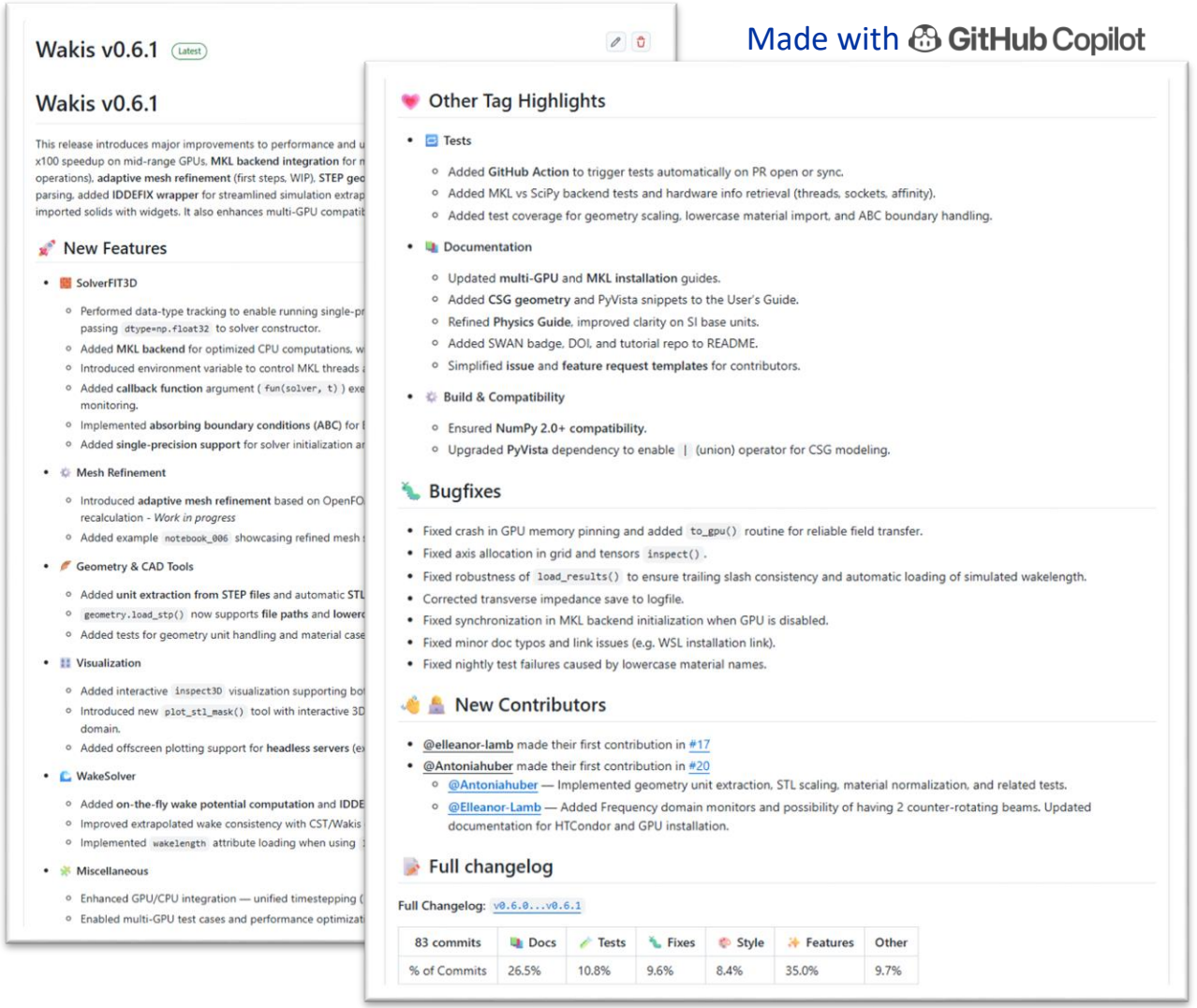
New releases

- Major release #v0.6.0 (May 27th):
- **Main feature:** running *MPI simulations* on CPU and GPU using `mpi4py` → Check deep-dive on Wakis#2

- Minor release #v0.6.1 (Nov 5th):

Features:

- ***Multithreading*** execution with `Intel MKL` support for OpenMP → speedup x6 on 12 threads for 10M cells simulation
- Execution on ***single*** (np.float32) *or* ***double*** (np.`float64`) ***precision*** → speedup x2 and ½ memory on CPU, speedup up to x32 on consumer GPUs (RTX, Titan)
- ***Freq-domain field monitors*** and ***counter-rotating beams*** by E. Lamb→ Today's topic ☺
- ***Smart meshing*** foundations & parameter ***logger*** by A. Huber

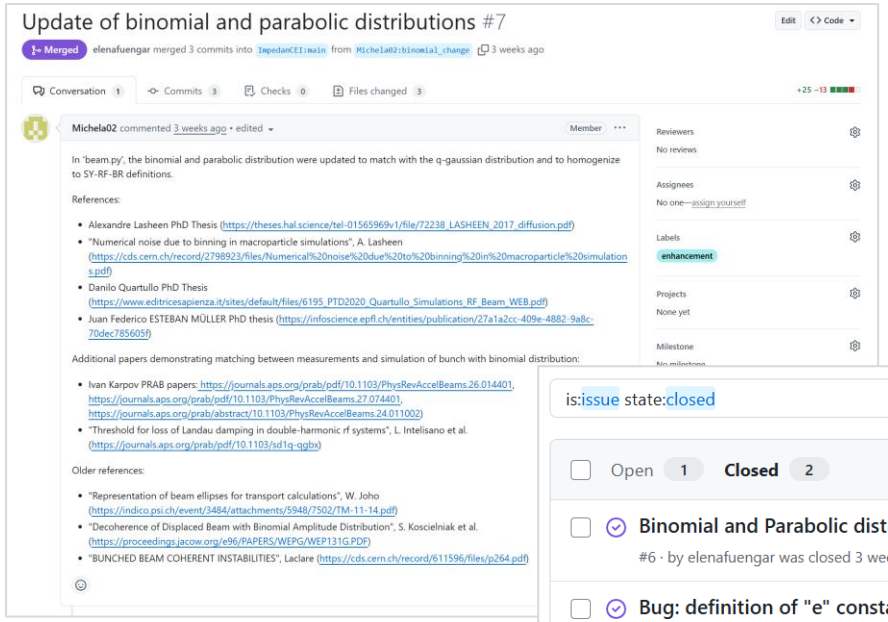


New releases

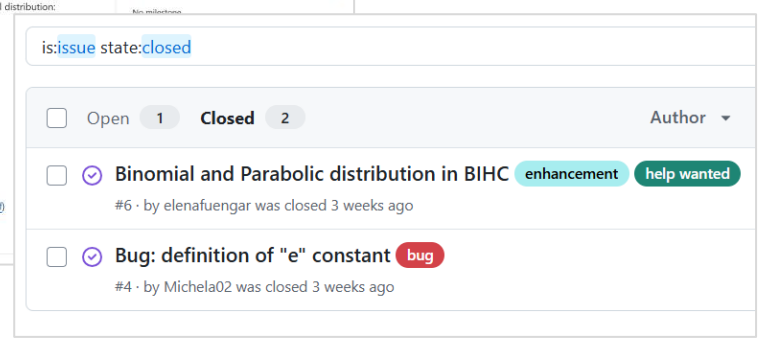
- Minor release #v0.1.1 (May 27th):

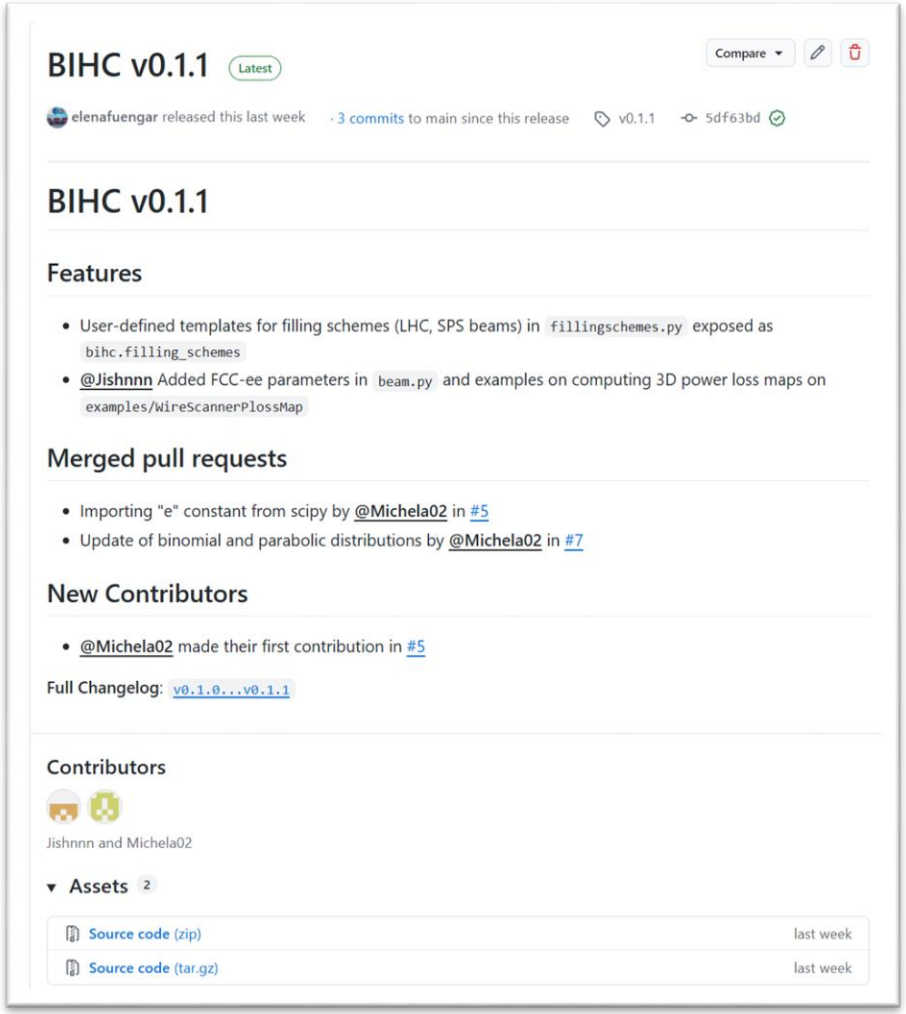
Contributions:

- Updated *Binomial* and *Parabolic* distributions to match the RF Toolbox by Michela Neroni (Issue #4 and #6)
- FCC-ee beam parameters and 3D power loss maps by Jintao Li



Documented via Issues and Pull Requests





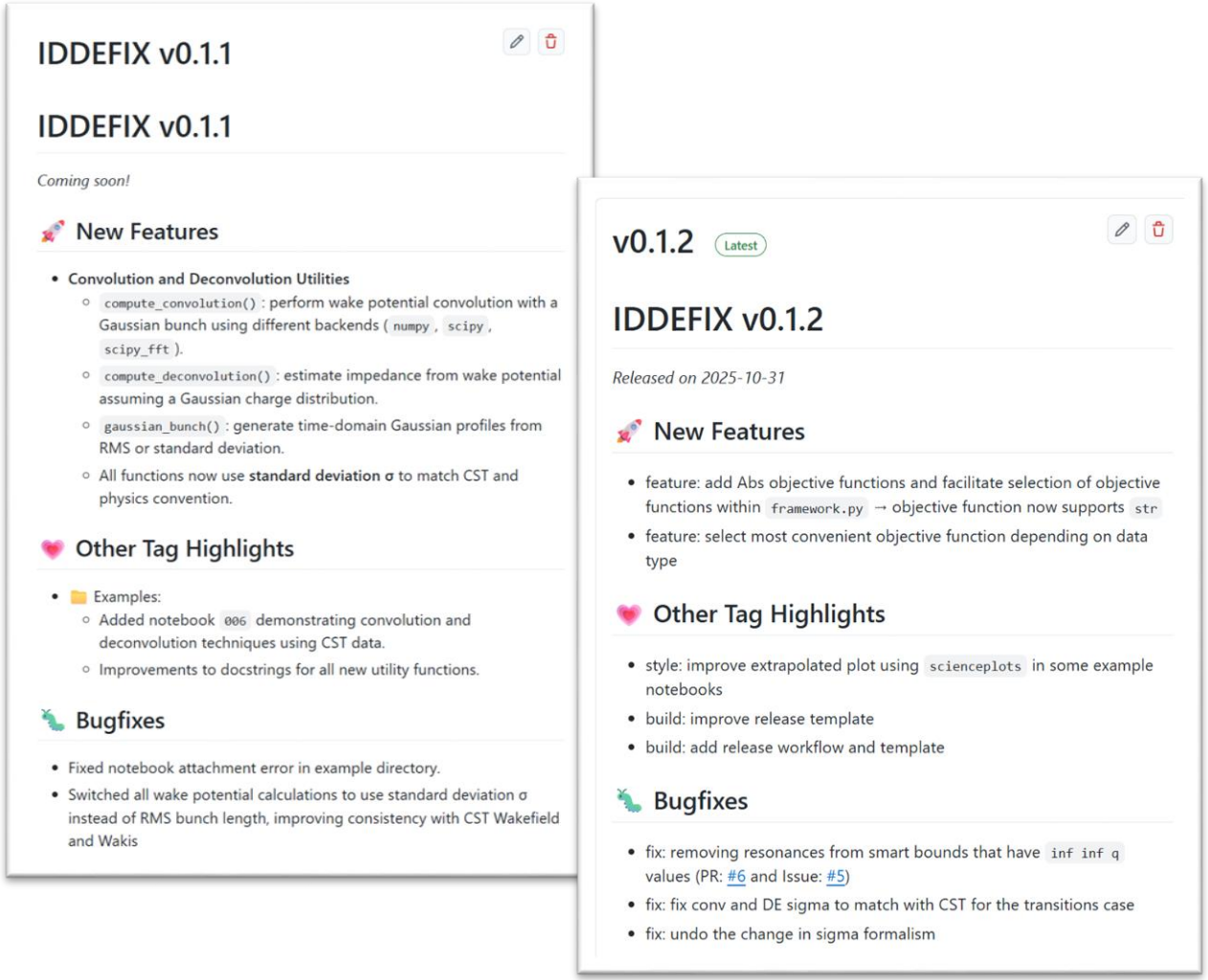
New releases

IDDEFIX

- Minor releases #v0.1.1 (July 22nd) and #v0.1.2 (Oct 26th)

Features:

- Compute *convolution and deconvolution* with a Gaussian bunch after discussion with E. Macchia → showcase in example 006
- Automatic detection of *best objective function* depending on data type (real / complex)



IDDEFIX v0.1.1

IDDEFIX v0.1.1

Coming soon!

New Features

- **Convolution and Deconvolution Utilities**
  - `compute_convolution()` : perform wake potential convolution with a Gaussian bunch using different backends (`numpy` , `scipy` , `scipy_fft`).
  - `compute_deconvolution()` : estimate impedance from wake potential assuming a Gaussian charge distribution.
  - `gaussian_bunch()` : generate time-domain Gaussian profiles from RMS or standard deviation.
  - All functions now use **standard deviation σ** to match CST and physics convention.

Other Tag Highlights

- Examples:
  - Added notebook `006` demonstrating convolution and deconvolution techniques using CST data.
  - Improvements to docstrings for all new utility functions.

Bugfixes

- Fixed notebook attachment error in example directory.
- Switched all wake potential calculations to use standard deviation σ instead of RMS bunch length, improving consistency with CST Wakefield and Wakis

v0.1.2 Latest

IDDEFIX v0.1.2

Released on 2025-10-31

New Features

- feature: add Abs objective functions and facilitate selection of objective functions within `framework.py` → objective function now supports `str`
- feature: select most convenient objective function depending on data type

Other Tag Highlights

- style: improve extrapolated plot using `scienceplots` in some example notebooks
- build: improve release template
- build: add release workflow and template

Bugfixes

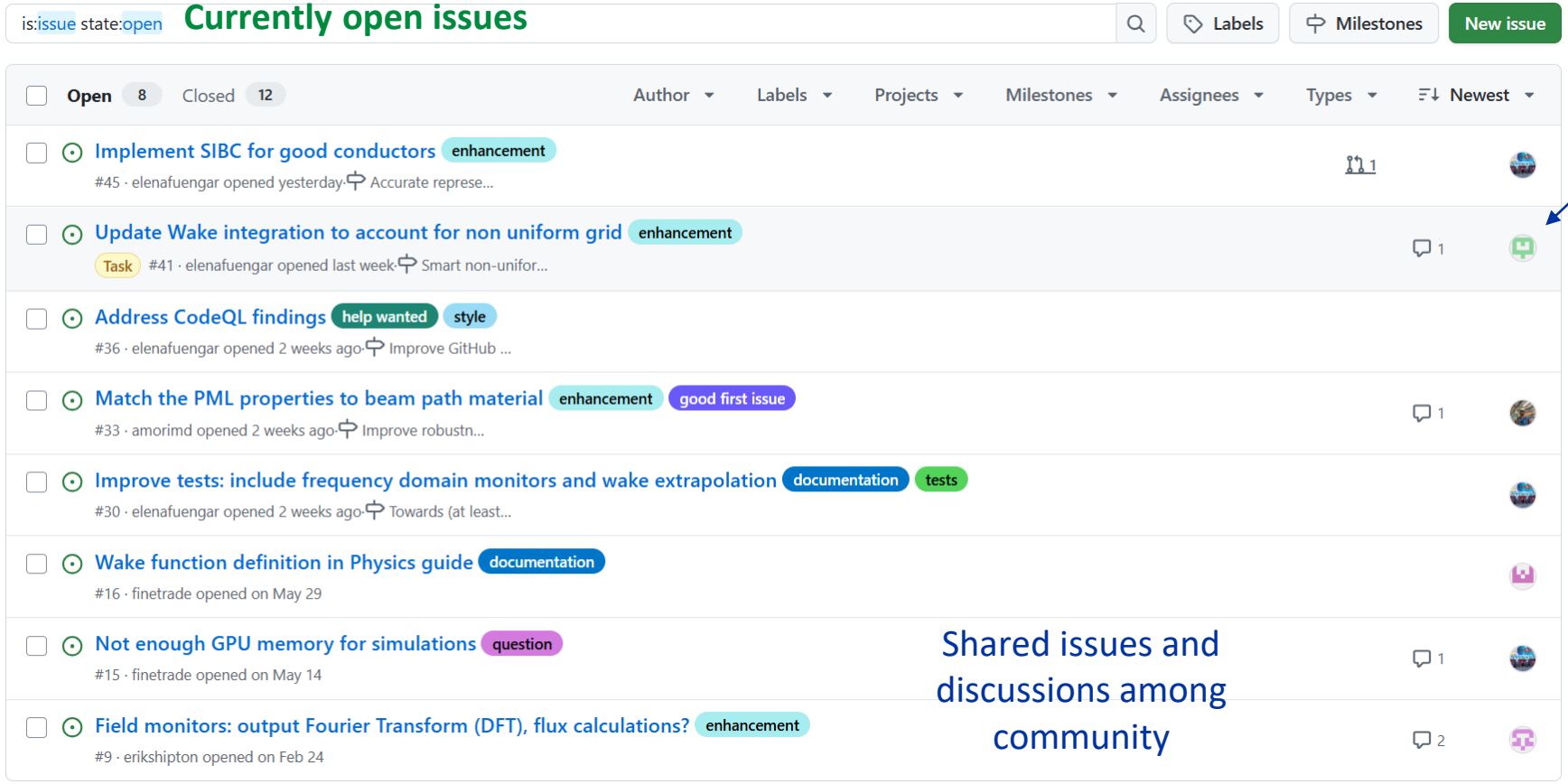
- fix: removing resonances from smart bounds that have `inf inf q` values (PR: #6 and Issue: #5)
- fix: fix conv and DE sigma to match with CST for the transitions case
- fix: undo the change in sigma formalism

Collaborative workflow (Issue → Pull Request)

- To track and document features and bugs needed, open a GitHub ISSUE and propose changes through a Pull-Request linked to that issue ☺

Improved traceability and organization

Track milestone progress



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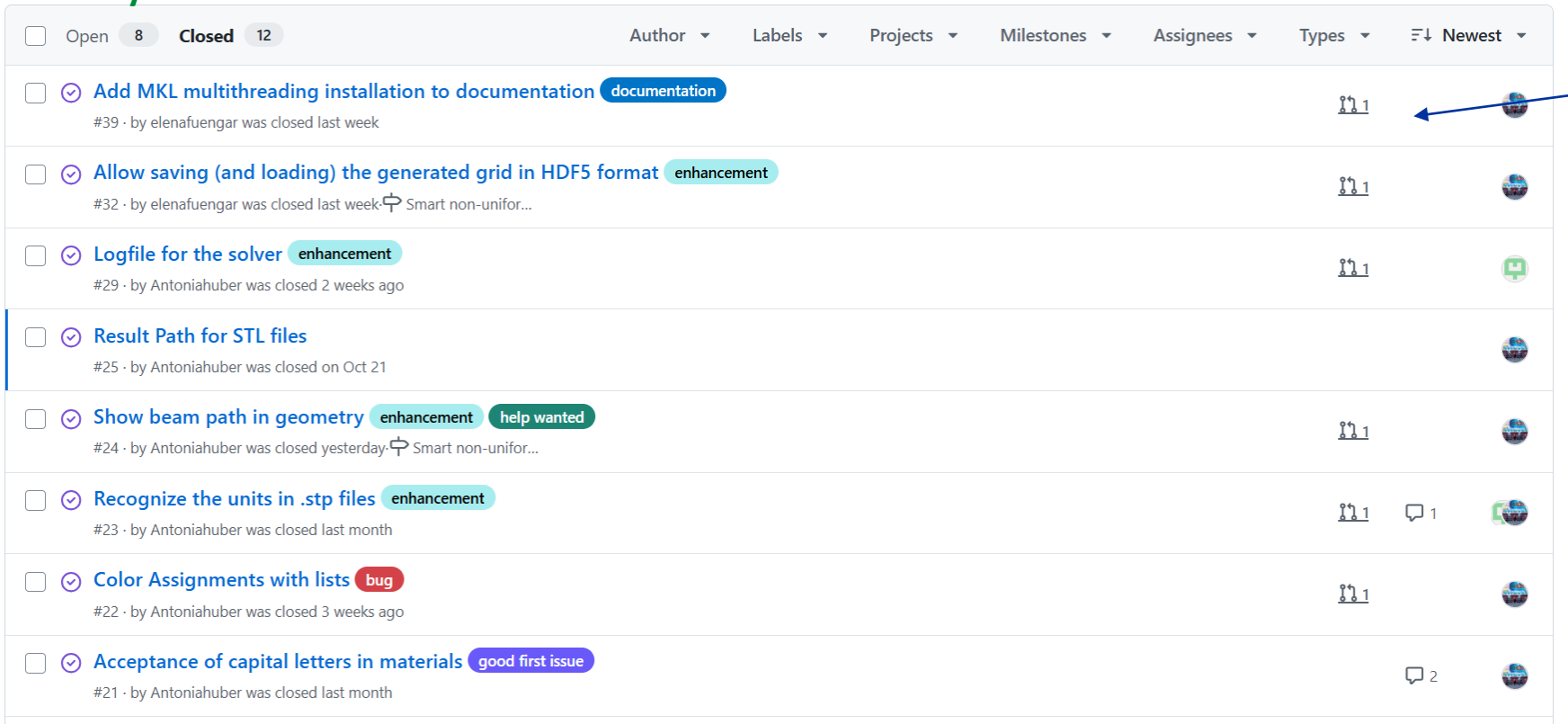
Recently closed Issues



Label and categorize code changes

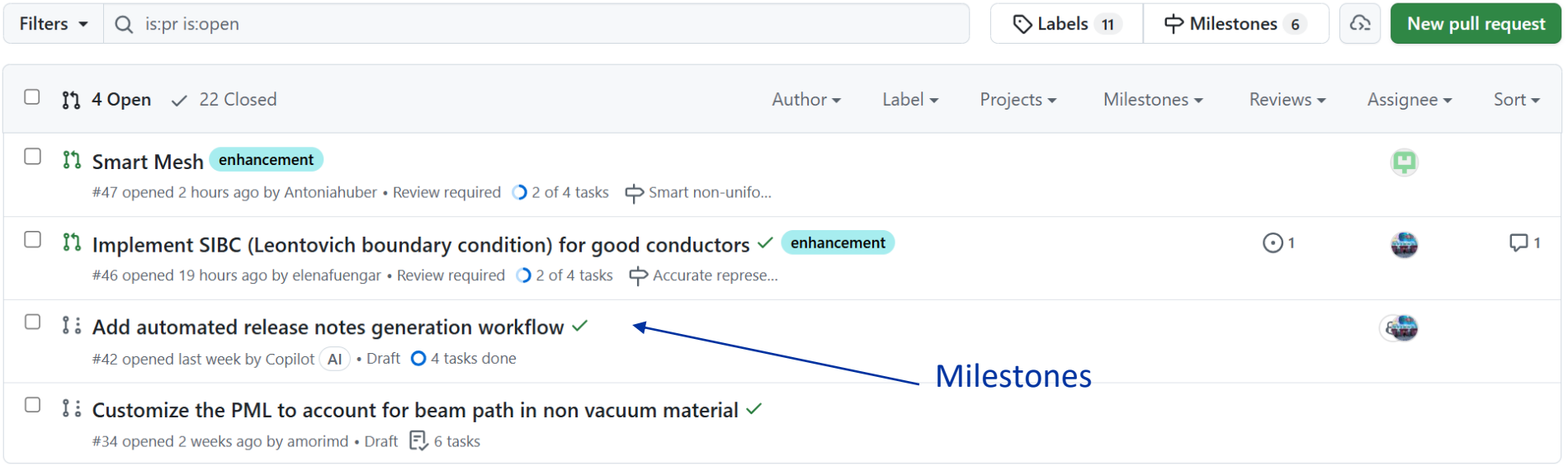
Automatically linked pull request

Every pull-request needs to pass the **automatic CPU/MPI tests** to be merged

Collaborative workflow (Issue → Pull Request)

- To track and document features and bugs needed, open a GitHub ISSUE and propose changes through a Pull-Request linked to that issue ☺

Open pull requests

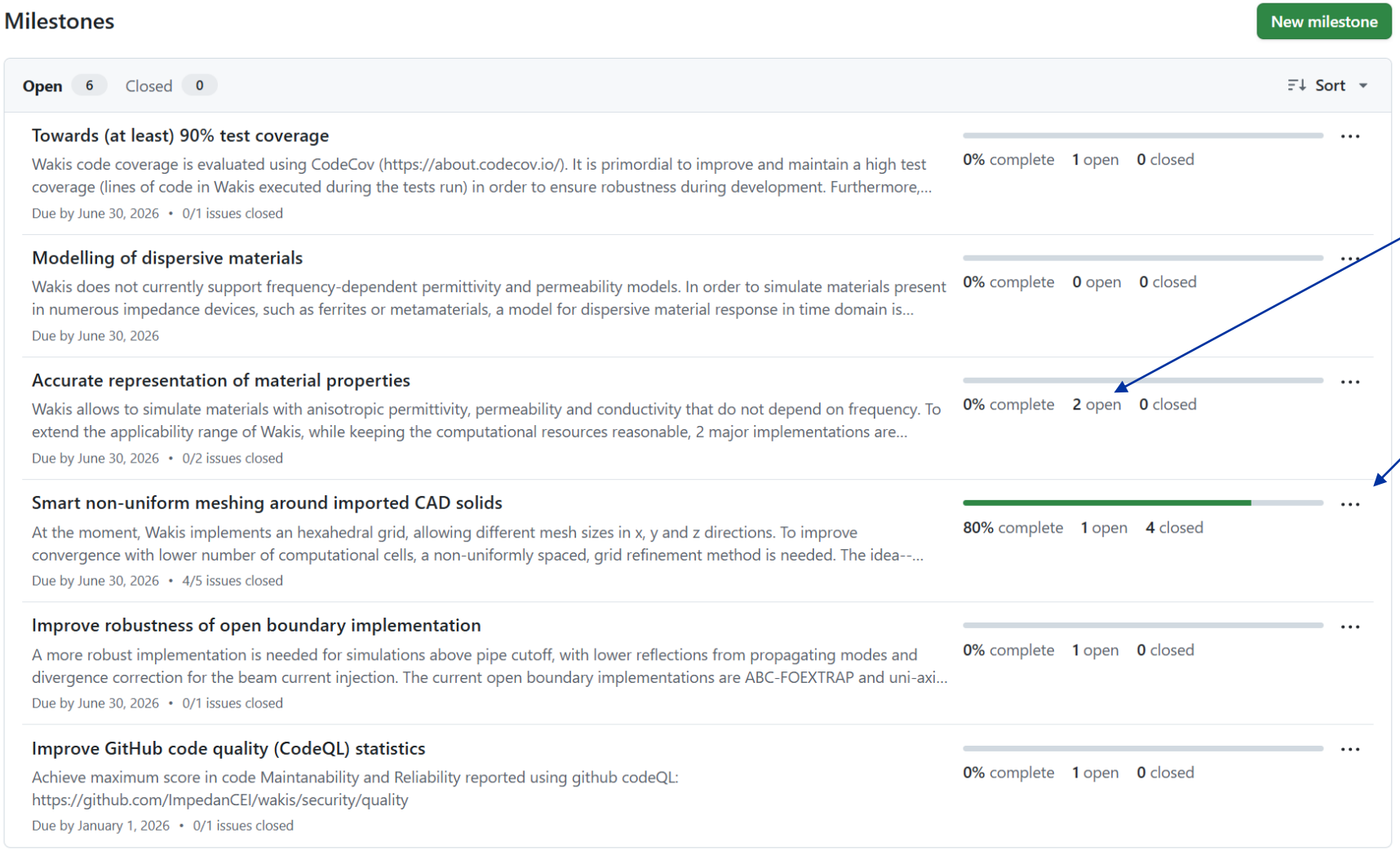


Pull request template tasks:

- Follows PEP8 guidelines *(checked by CodeQL pipeline)*
- Passes automatic tests *(checked by MPI/CPU test pipeline)*
- Added to documentation or used in an example

Every pull-request needs to pass the **automatic CPU/MPI tests** to be merged

Project milestones



Show issues and pull-request related to the milestone

Track milestone progress (merged Pull-requests)

Thank you for participating ☺

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Thanks to all!

Code development is a big collaborative team effort:

Thanks to contributors (code or expertise):

Wakis team: Lorenzo Giacomel, Giovanni Iadarola, Carlo Zannini, Manuel Cotelo, Ellenor Lamb, Antonia Huber

Iddefix team: Malthe Raschke Nielsen, Sébastien Joly, Bernardo Abreu Figueiredo

BIHC team: Leonardo Sito, Francesco Giordano, Jintao Li, Benoit Salvant, Carlo Zannini, Michela Neroni

Neffint team: Eskil Vik, Nicolas Mounet

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& Eduardo Oliva (UPM)
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