Lenstool developments

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The Lenstool ecosystem

- Redmine wiki https://projects.lam.fr/projects/lenstool/wiki
- Gitlab repository https://git-cral.univ-lyon1.fr/lenstool/lenstool
- Google group email list https://groups.google.com/g/lenstool
- ReadTheDoc https://lenstool-tutorial.readthedocs.io
- Slack workspace https://lenstool.slack.com
- Strong Lensing Cluster Atlas https://data.lam.fr/sl-cluster-atlas/home

Current developers

- Benjamin Beauchesne (Durham): combination lensing / X-rays / ICL / galaxy stellar kinematics (IFU)
- Johan Richard (CRAL): Source reconstruction
- Eric Jullo (LAM): Code maintenance / Multiplane lensing / self interacting fuzzy dark matter soliton profiles
- Joseph Alligham (Sydney): combination lensing / X-rays / hydro
- Anna Niemiec (LPSC): Combination strong & weak lensing => hydrid-Lenstool
- Tomas Verdugo (UNAM): combination lensing / cluster member kinematics



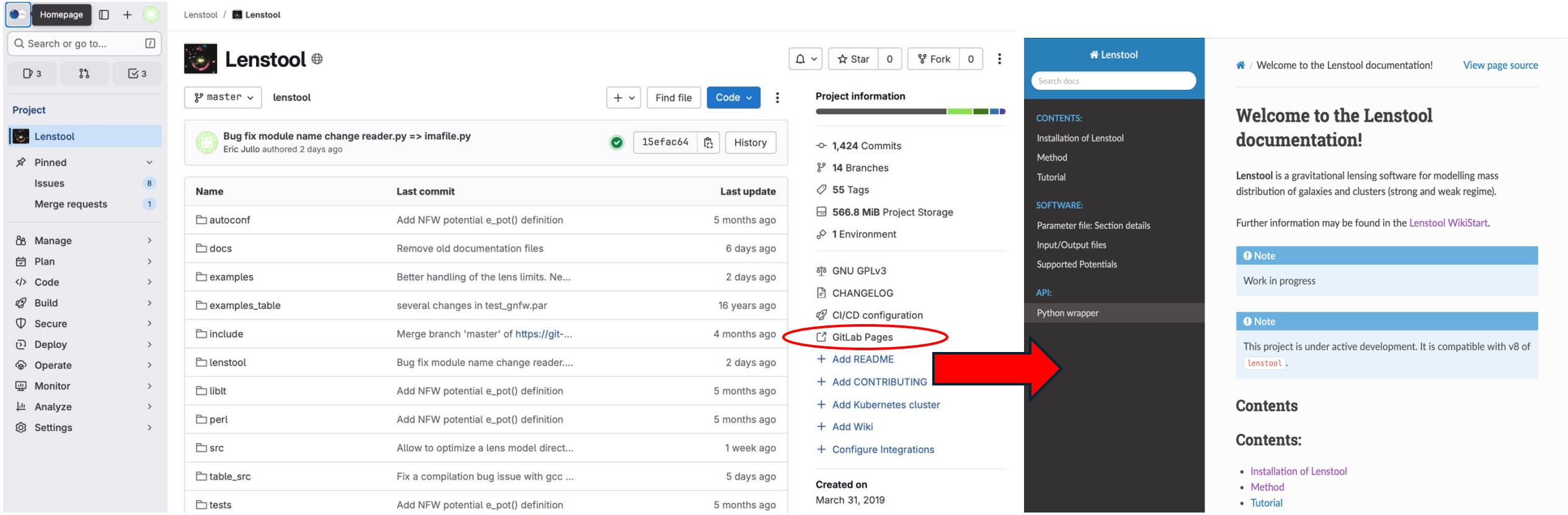


Commit CI/CD & Conda Deployment

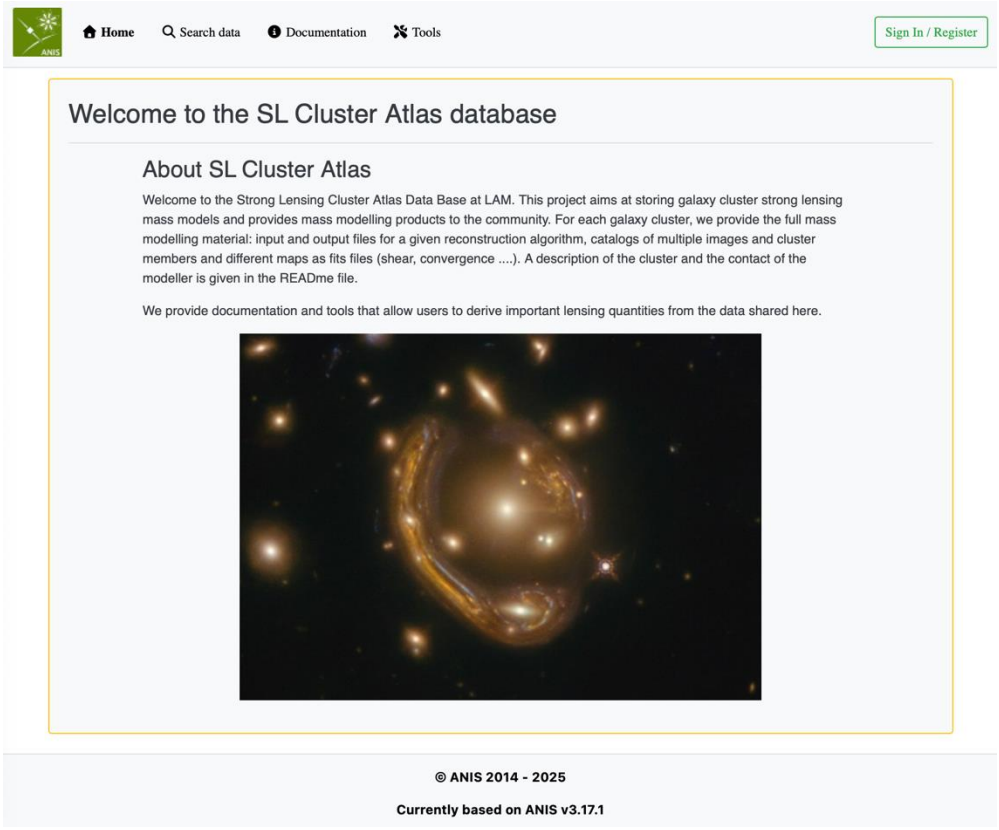
- A Gitlab CI/CD pipeline is launched automatically after each commit (NEW!! April 2025)
- Automatic procedure:
  - Create a virtual Ubuntu environment with Python 3.10 and dependencies
  - Compile and install C & Python code
  - Make checks
  - Build ReadTheDoc documentation located in ./docs
- Conda deployment recipes are stored in the conda-forge lenstool-feedstock repository
- A conda-bot checks new Lenstool tags on GitLab and creates a PR that lenstool-feedstock maintainers validate (Eric or Benjamin)

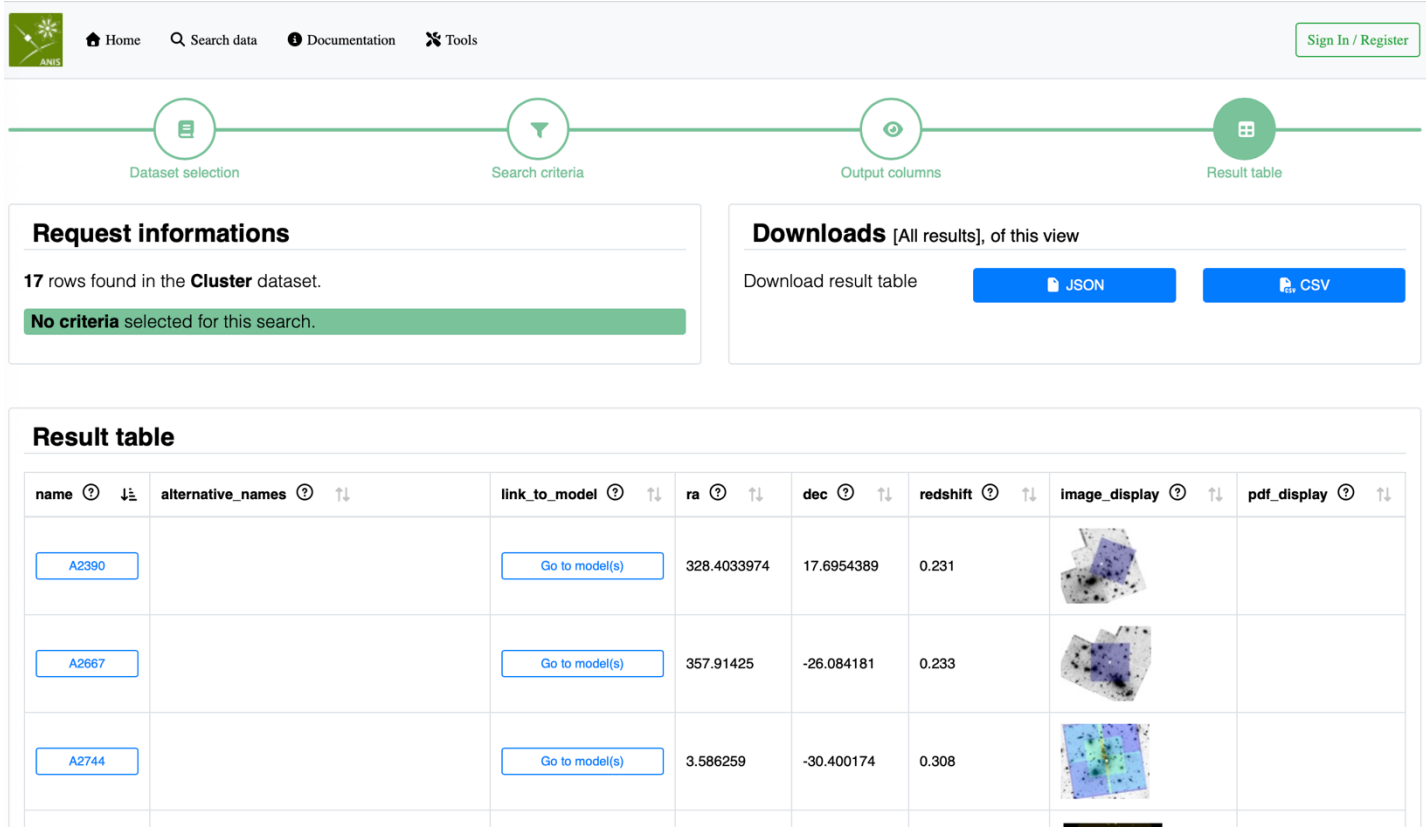
Documentation

- Documentation is compiled after each building job in the ReadTheDoc format
- It is stored on the Gitlab server, and accessible in the Pages section



Strong Lensing Cluster Atlas





The soliton branch

- Example in ./examples/example_soliton
- A soliton is the analytical solution of a scalar field dark matter

$$\rho_{\rm sol}(r) = \frac{\rho_{0\rm sol}\,\sin(\,r/r_a)}{r/r_a}$$

with the radius

$$r_a^2 = \frac{3\lambda_4}{16\pi G_N m^4}$$

- The outer halo region are NFW profile, with a transition radius r_t

$$M_{\rm sol}(r_t) = \alpha M_{\rm NFW}(r_t)$$

- r_a in the range ~10kpc => m in the range 10^{-21} – 10^{-3} eV

Galazo-Garcia et al. 2024