



SKyPy

Lucia F. de la Bella

And the SkyPy Collaboration

**7. RESEARCH
DEVELOPMENT**

1. VISION

**6. DRIVER
CAPABILITIES**

2. STRUCTURE

**5. LAYERED
DEVELOPMENT**

3. MEMBERS



4. THE PACKAGE

1. Vision

- Observational cosmology and extra-galactic observations limited by data access
- Open-data revolution in astronomy (LSST, Euclid, WFIRST...)
- Challenge: access to sophisticated analysis **methods**.
- Emerging methods: forward modelling & machine learning.



SkyPy

- **Open-source** off-project high-quality **Python** package
- Functionality to make **end-to-end simulations**
- Enable **Forward Modelling** and **Machine Learning**
- Simulation pipelines (YAML files)
- Interface with external software

- Do not replicate existing code
- Reuse
 - Astropy-affiliated packages
 - High-quality codes

MANAGEMENT STRUCTURE

- A **Board** manages membership, policies
- **Dynamic team** structures. i.e. minimise permanent SkyPy structures
- Standup teams for specific tasks on short time-scales (3 months)
- Rewards through **citations** of package

CODE STRUCTURE

- SkyPy package driven by science projects
- Done as a **GitHub** organisation
 - * **Issues** to request/inform of features, report bugs
 - * **Pull requests**, unit tests, high-standard documentation
 - * **Code review**
 - * Actively involved **infrastructure** team
 - * Semantic versioning / staged releases

3. Members

Sarah Bridle

Juan Pablo Cordero

Ian Harrison

Laura Wolz

Richard Rollins

Nicolas Tessore



Adam Amara

Philipp Sudek

Lucia F. de la Bella

Ginevra Favole

Arthur Tolley



Coleman Ktawczyk

Ian Harry

Laura Nutall

Andrew Lundgren

Andrew Williamson



Brian Nord

Simon Birrer



Keiichi Umetsu

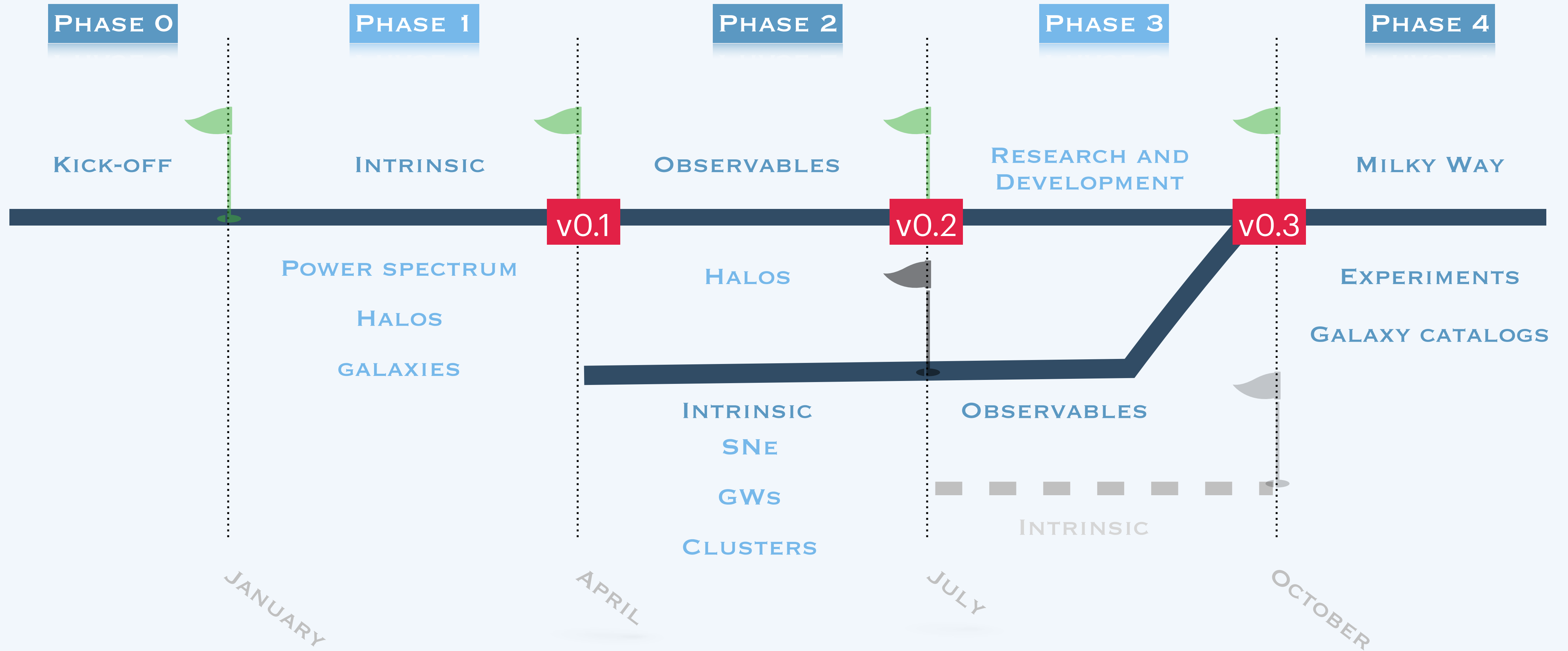
Sut-ieng Tam

4. The package



v0.4

5. Layered development



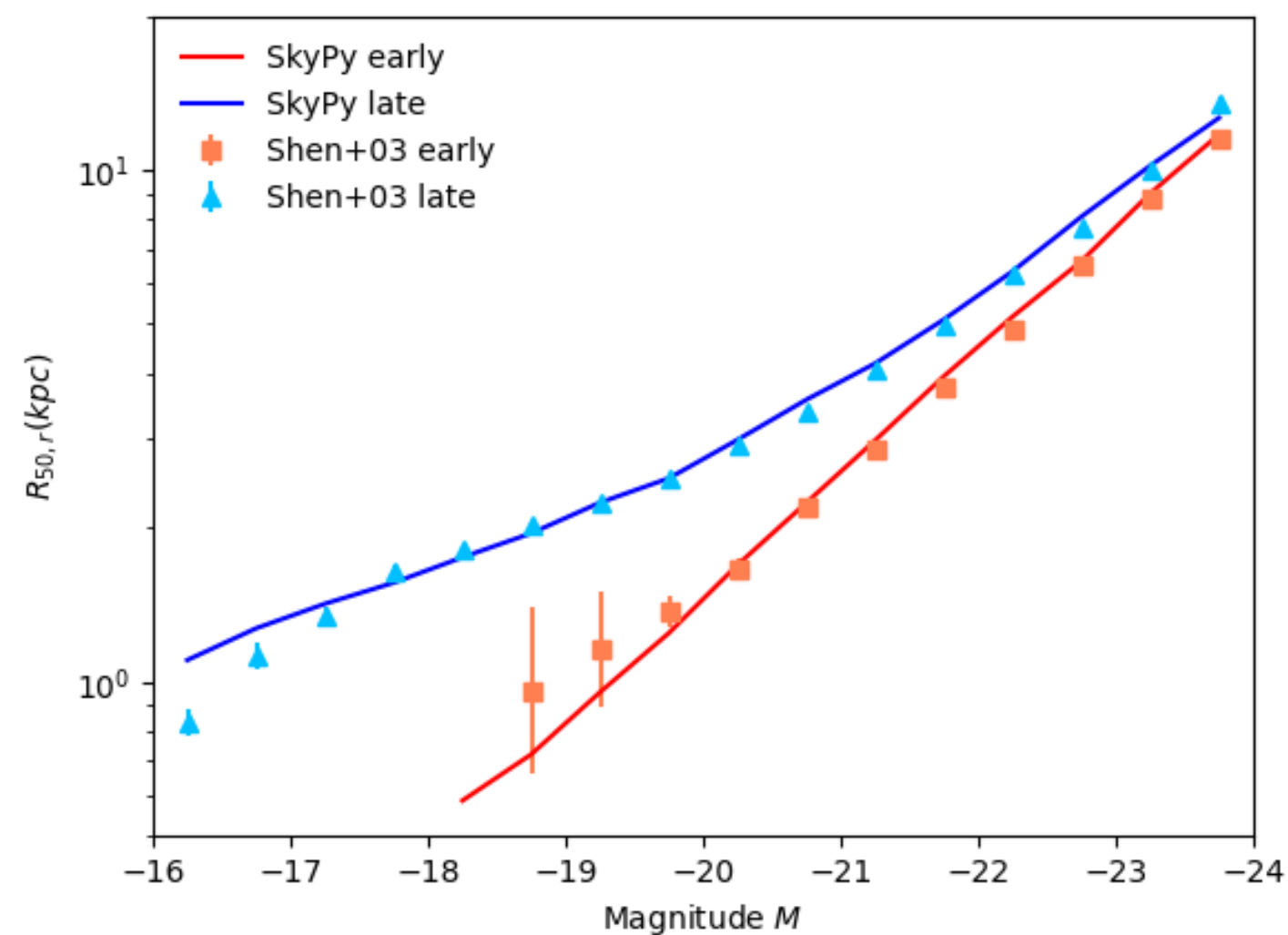
6. Driver Capabilities

Key

The **SkyPy Driver** runs end-to-end **pipelines** of functions with **dependencies** to generate outputs.

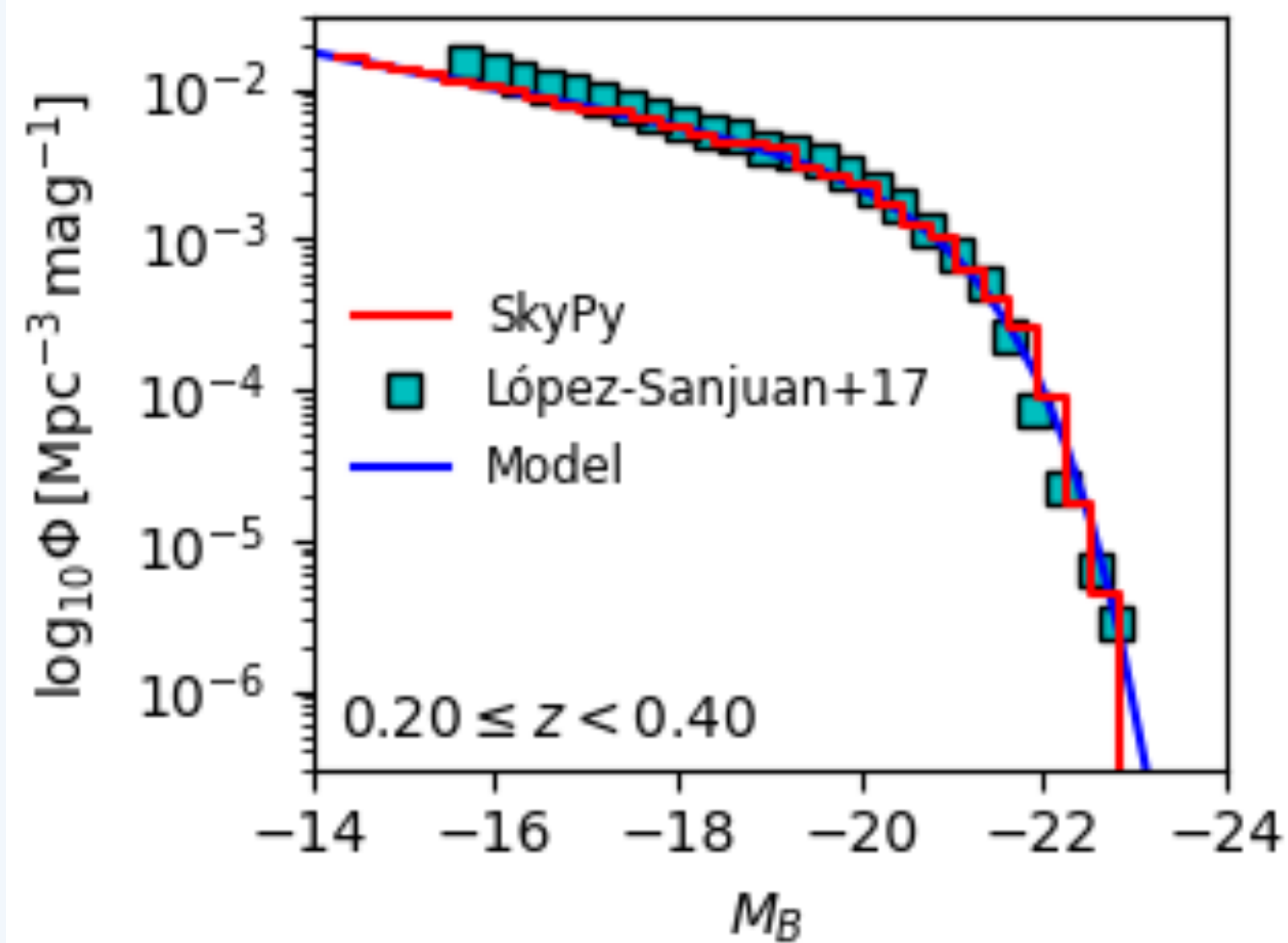
Examples [skypy/examples/galaxies](https://github.com/skypyproject/skypy/blob/master/examples/galaxies)

Galaxy Size Distributions



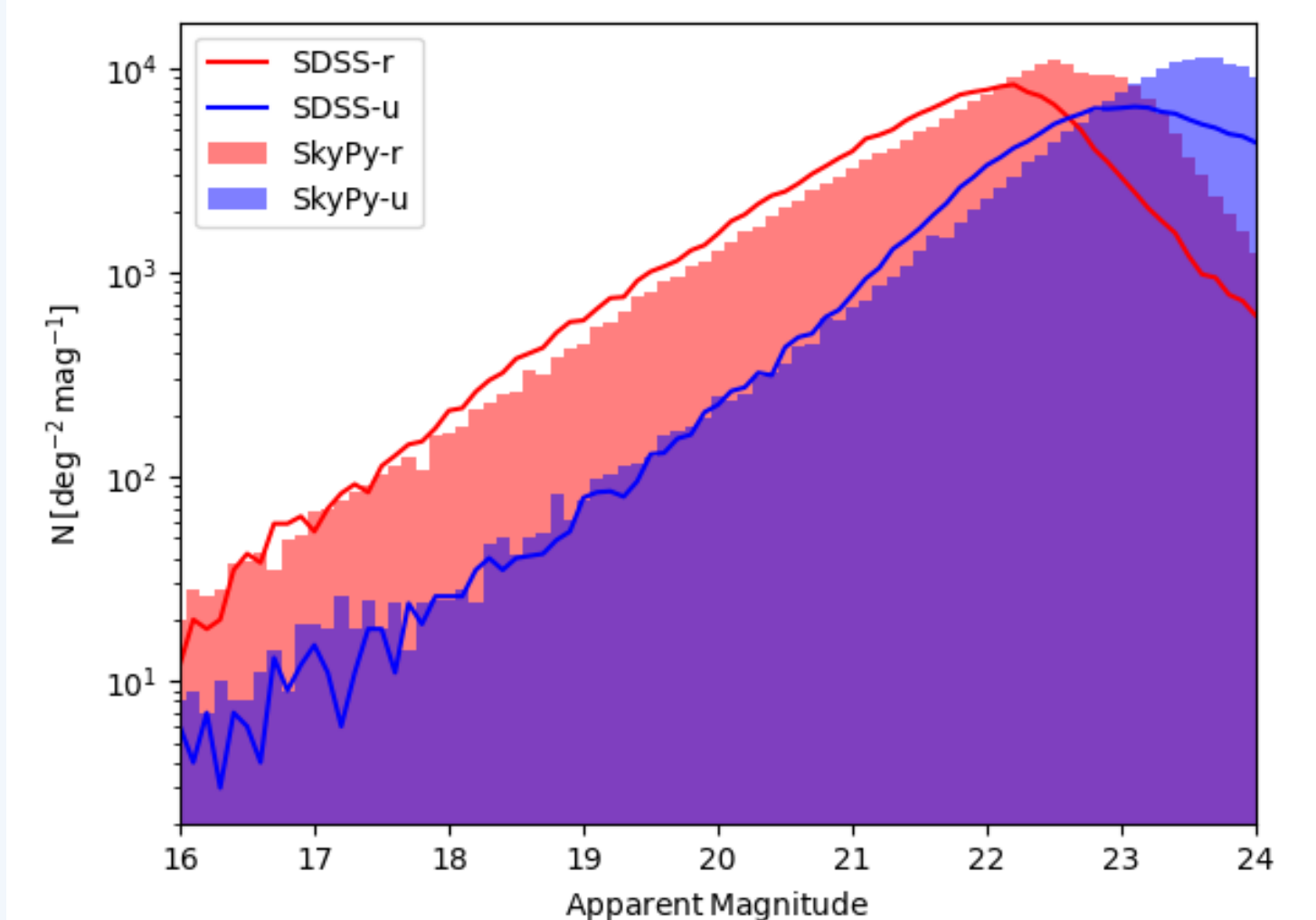
SkyPy galaxy size model (SDSS data) vs Shen et al 2003

Schechter Luminosity Function



SkyPy sampled galaxies B-band magnitudes vs ALHAMBRA survey

Optical Photometry



kcorrect Spectral Templates



6. Driver Capabilities

Key

The **SkyPy Driver** runs end-to-end **pipelines** of functions with **dependencies** to generate outputs.

Combine SkyPy
with your favourite
software!



Take-away

- **SkyPy** is flexible
- & meets user's needs

Simulated lensed galaxies using *SkyPy* and *lenstronomy* (Simon Birrer)

7. Research Development

Key

SkyPy is driven by science projects



<https://github.com/skypyproject/skypy.git>

Summary

- SkyPy is a legacy project
- Open-source high-quality **Python** package
- Driven by science projects
- Does **not replicate** existing high-quality code
- With functionality to make **end-to-end simulations**
- Interface with external software
- Enabling **Forward Modelling** and **Machine Learning** methods

What's next

- **v0.5** release: halo modules.
- Journal of Open-Source Software
- Equality, Diversity and Inclusion projects

Open your terminal...

```
my-pc: -$ pip install skypy or
```

```
my-pc: -$ conda install -c conda-forge skypy or
```

```
my-pc: -$ git clone https://github.com/skypyproject/skypy.git
```

```
my-pc: -$ ipython
```

```
...
```

```
[1]: import skypy
```

Legacy project

- Open-source off-project
- High-quality **python** package
- Functionality for **end-to-end simulations**
- Enable **Forward Modelling & Machine Learning**



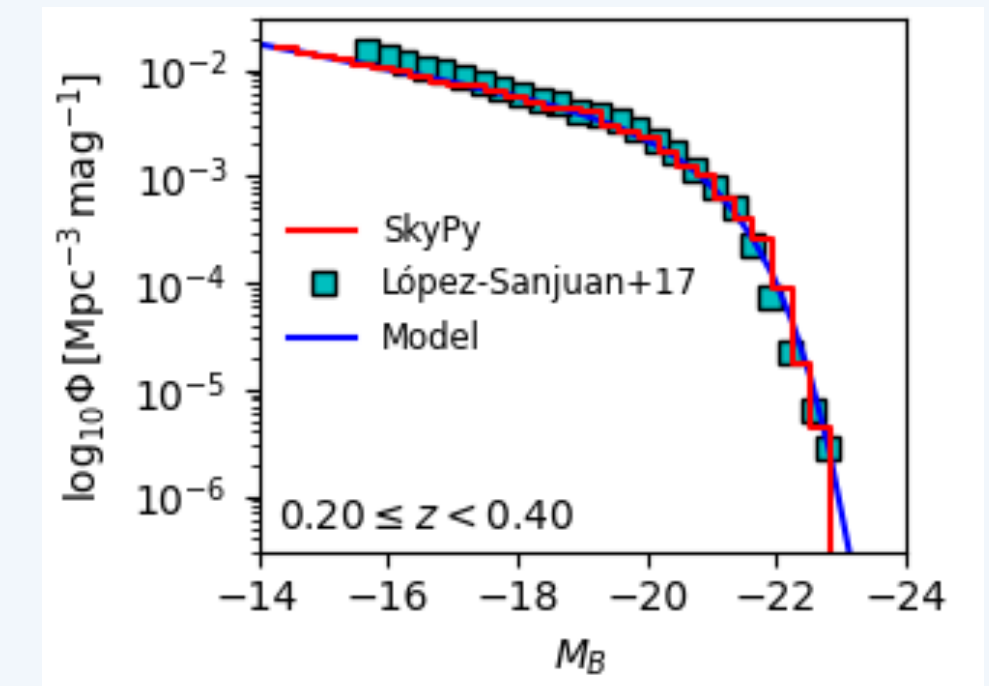
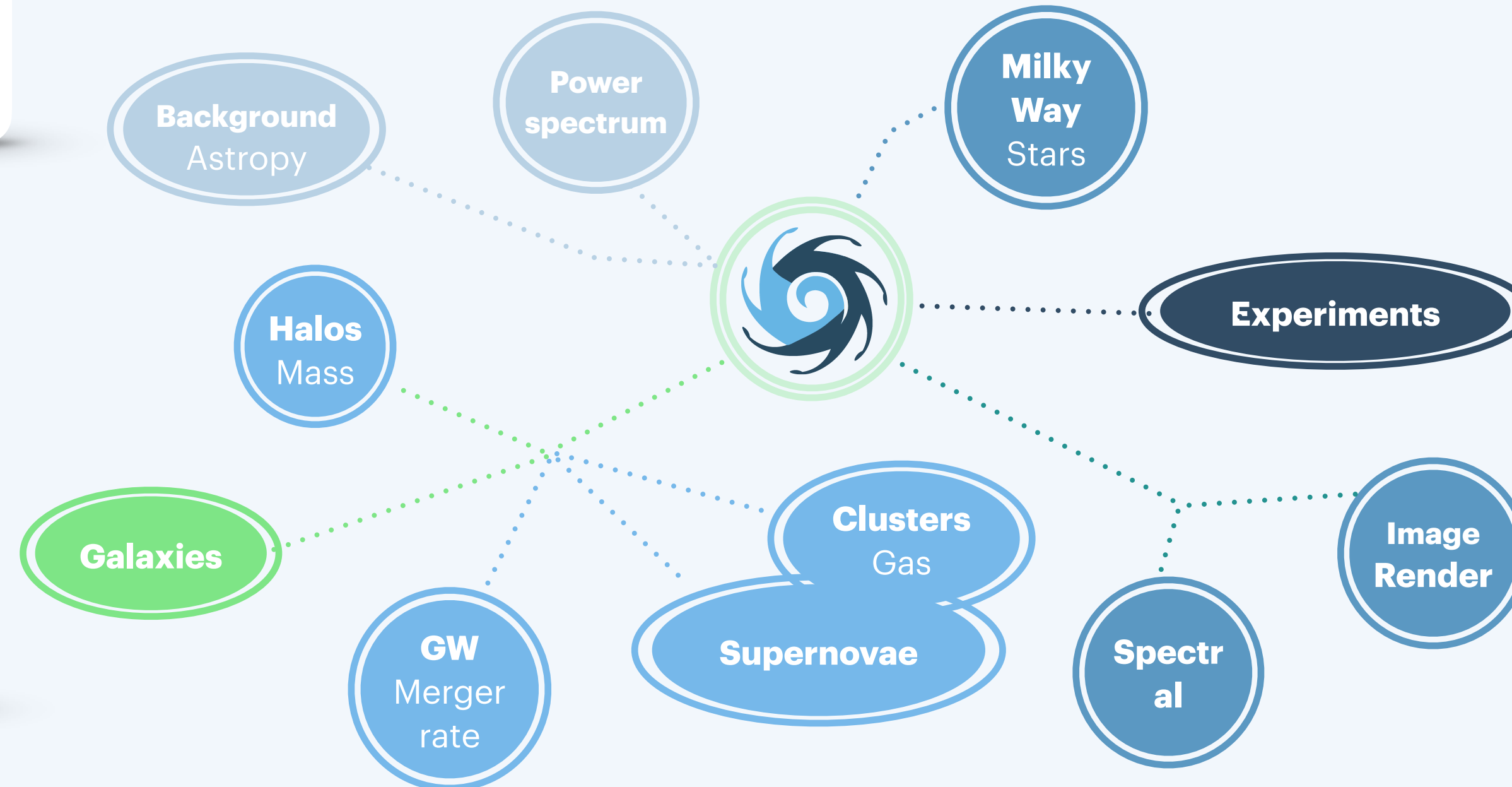
Key

The **SkyPy Driver** runs end-to-end **pipelines** of functions with **dependencies** to generate outputs.

SkyPy is driven by science projects



- **GitHub** organisation
- **Issues, pull requests**
- Unit tests, documentation
- **Code review**
- **Infrastructure team**



Next

- **v0.5** Halo modules.
- JOSS paper
- **Equality, Diversity and Inclusion**

```
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conda install -c conda-forge skypy or  
git clone https://github.com/skypyproject/skypy.git  
import skypy
```

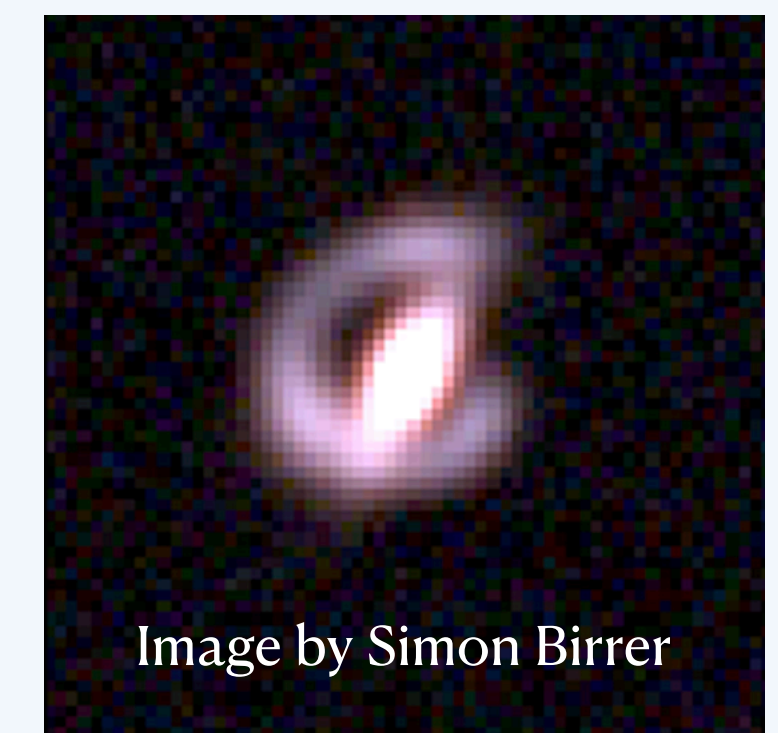


Image by Simon Birrer