OU-EXT

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Euclid Consortium
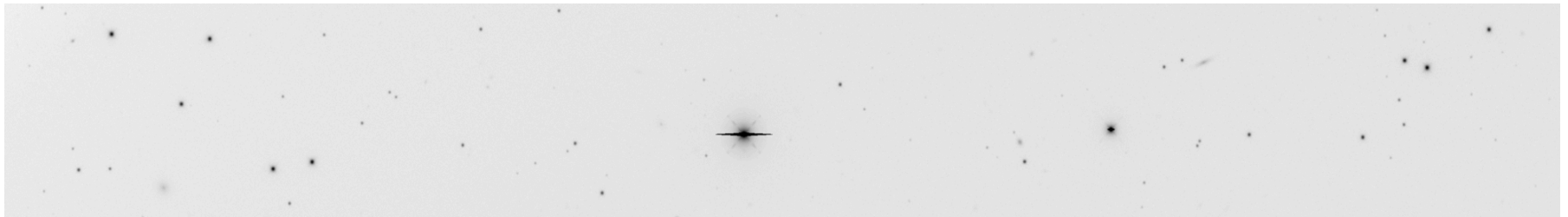
Français Arago Centre

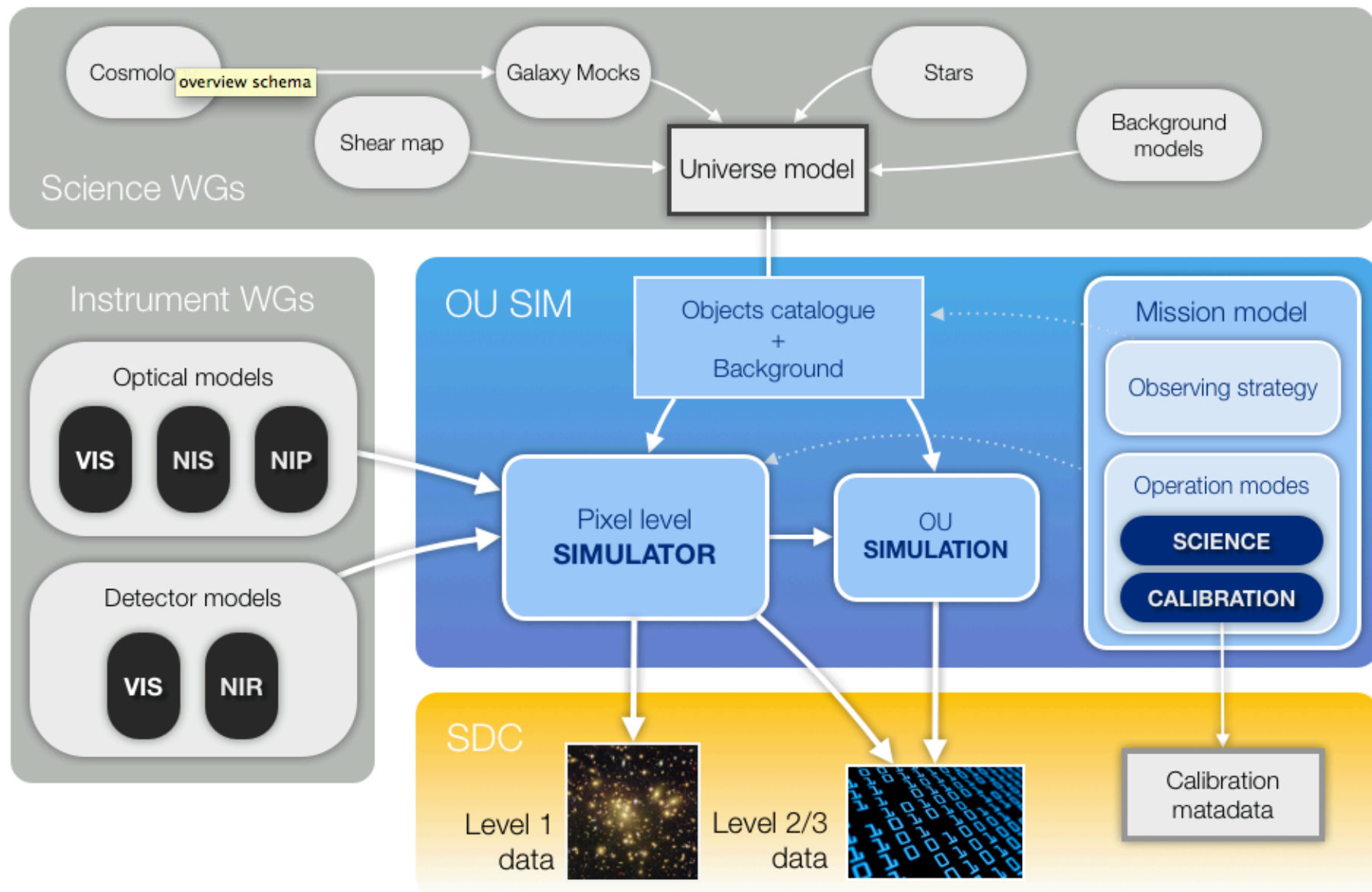PARIS DIDEROT

External Data

- Ground-based imaging
- Essential for photometric redshifts
- South:
  – Dark Energy Survey (DES) *grizY*
  – Option Large Synoptic Survey Telescope (LSST) *ugrizY*
- North:
  – Pan-STARRS – X
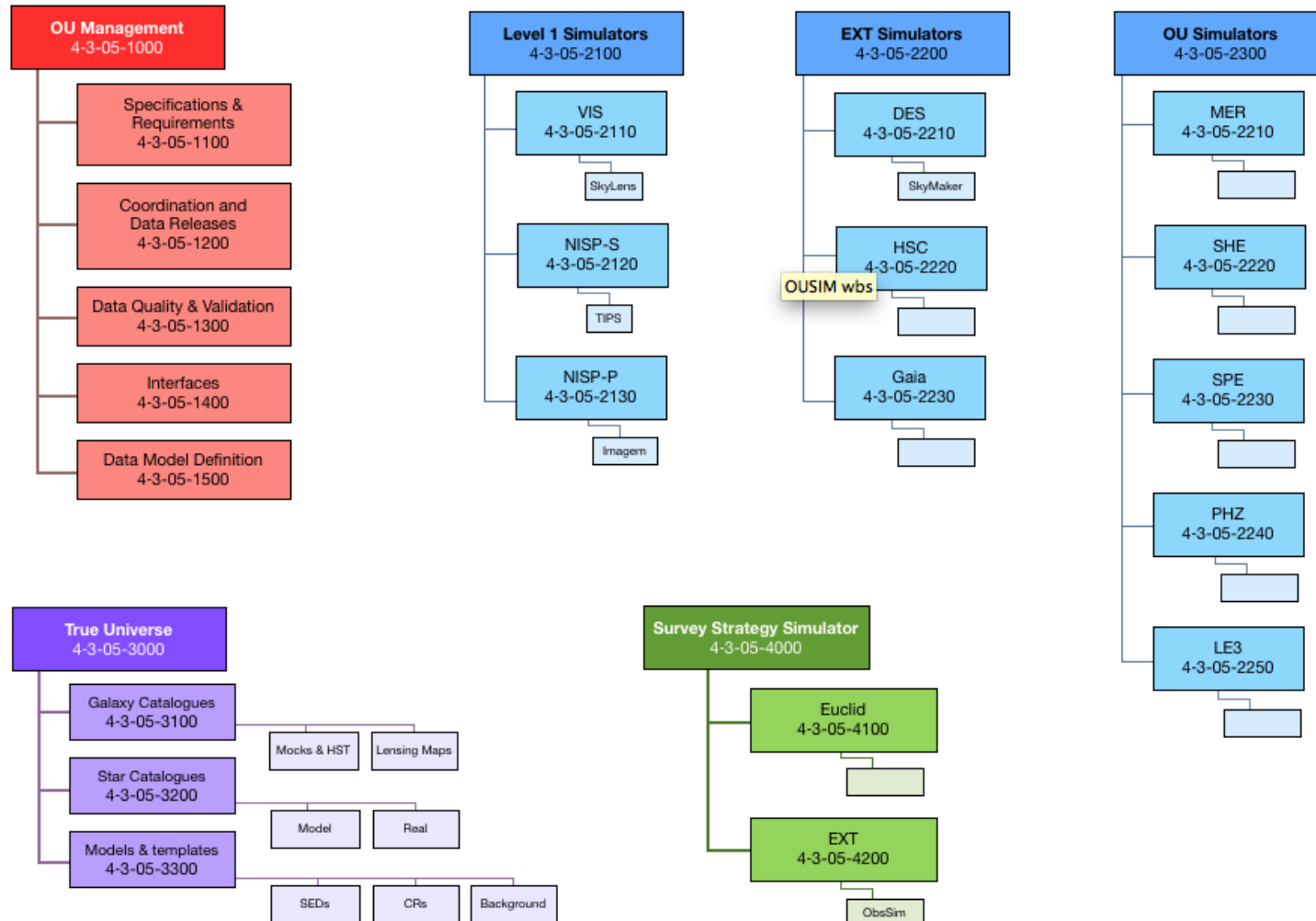 – HSC – decreasing probability
  – MegaCAM-RED?

OU-EXT

- Processes external imaging data
- Produces
  - Calibrated images and housekeeping data
  - Object catalogs
  - PSF information
- Simulations of external data (interface with OU-SIM)
  - Images and catalogs
- OU-EXT output passed to OU-MER

OUSIM overview

OUSIM Work Breakdown Structure

OU Management
4-3-05-1000

- Specifications & Requirements
4-3-05-1100
- Coordination and Data Releases
4-3-05-1200
- Data Quality & Validation
4-3-05-1300
- Interfaces
4-3-05-1400
- Data Model Definition
4-3-05-1500

Level 1 Simulators
4-3-05-2100

- VIS
4-3-05-2110
  - SkyLens
- NISP-S
4-3-05-2120
  - TIPS
- NISP-P
4-3-05-2130
  - Imagem

EXT Simulators
4-3-05-2200

- DES
4-3-05-2210
  - SkyMaker
- HSC
4-3-05-2220
- Gaia
4-3-05-2230

OUSIM wbs

OU Simulators
4-3-05-2300

- MER
4-3-05-2210
- SHE
4-3-05-2220
- SPE
4-3-05-2230
- PHZ
4-3-05-2240
- LE3
4-3-05-2250

True Universe
4-3-05-3000

- Galaxy Catalogues
4-3-05-3100
  - Mocks & HST
  - Lensing Maps
- Star Catalogues
4-3-05-3200
  - Model
  - Real
- Models & templates
4-3-05-3300
  - SEDs
  - CRs
  - Background

Survey Strategy Simulator
4-3-05-4000

- Euclid
4-3-05-4100
- EXT
4-3-05-4200
  - ObsSim

OUSIM_wbs.png – OUSIM wbs (67.6 kB) Santiago Serrano, 2013–02–13 18:15

EXT Simulator
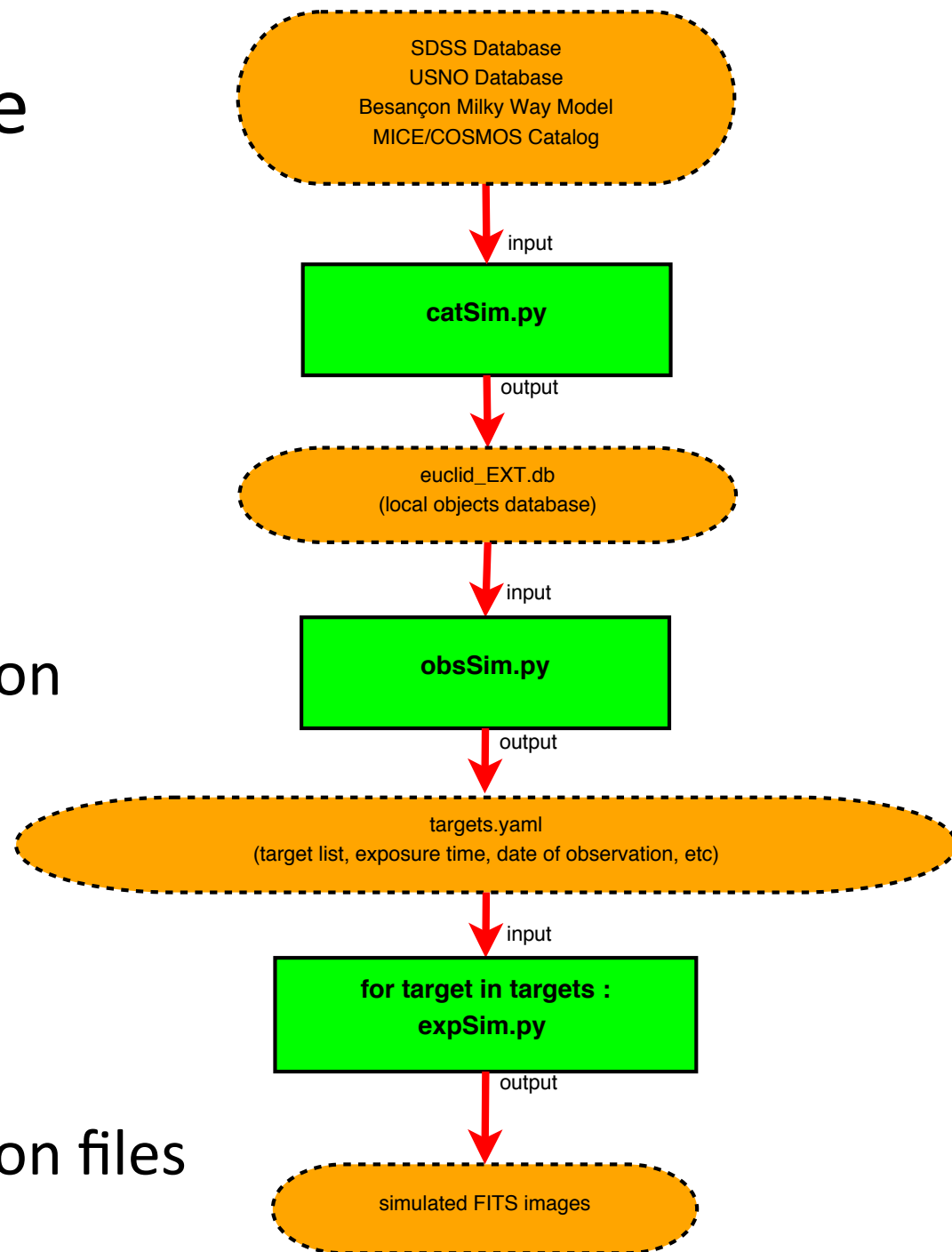# (APC: Bartlett, Fahed, Rahoui)

- Python + C

- Developed by OU-SIM members Santiago Serrano and Anne Bauer (ICE, Spain) for PAU (*Physics of the Accelerating Universe*) project

- Based on software *Skymaker* (Emmanuel Bertin, IAP & Pascal Fouqué, LATT)
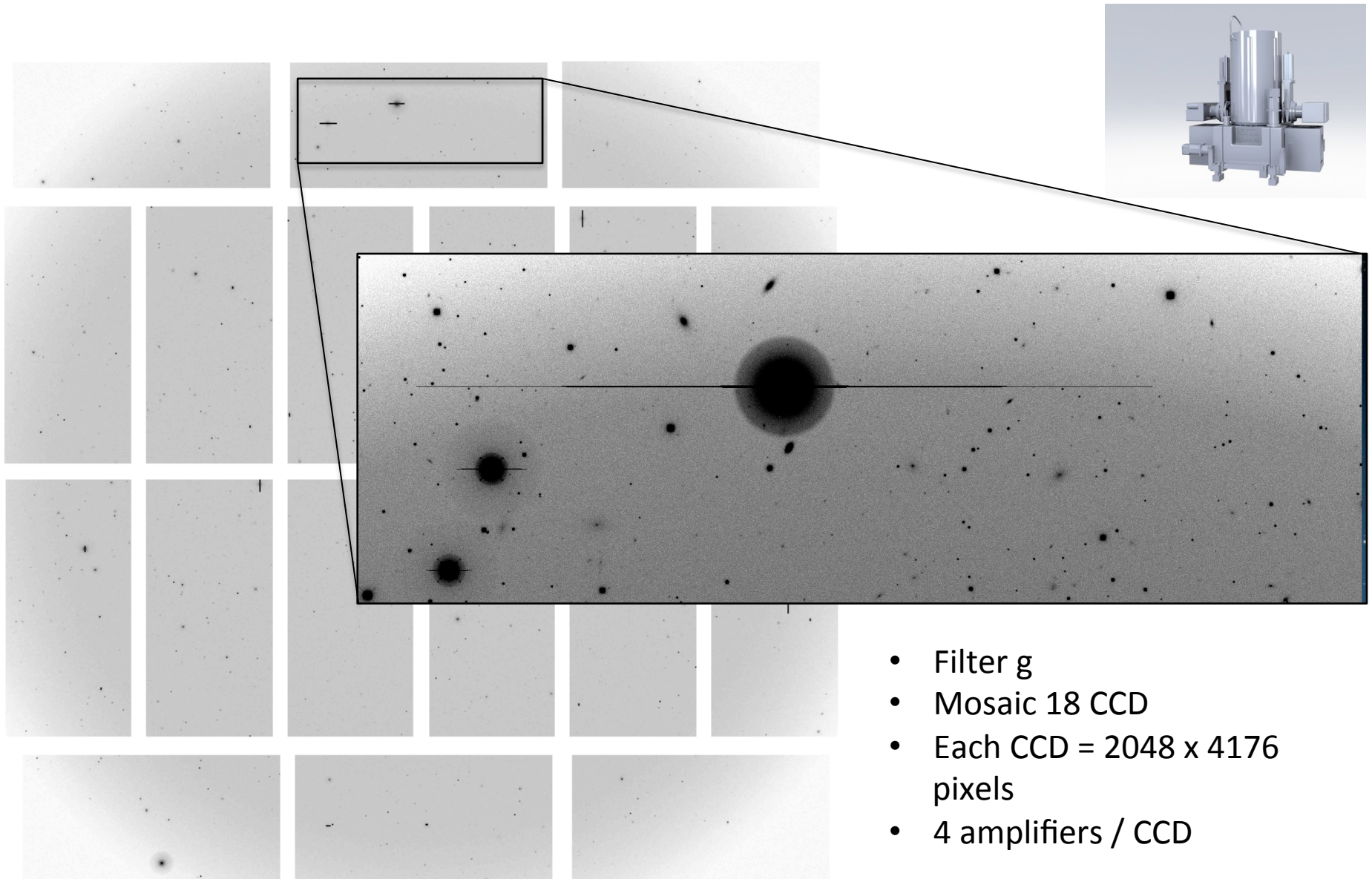
Description of the pipeline

Divided into 3 main procedures :

- Catalogue Simulation (CatSim)

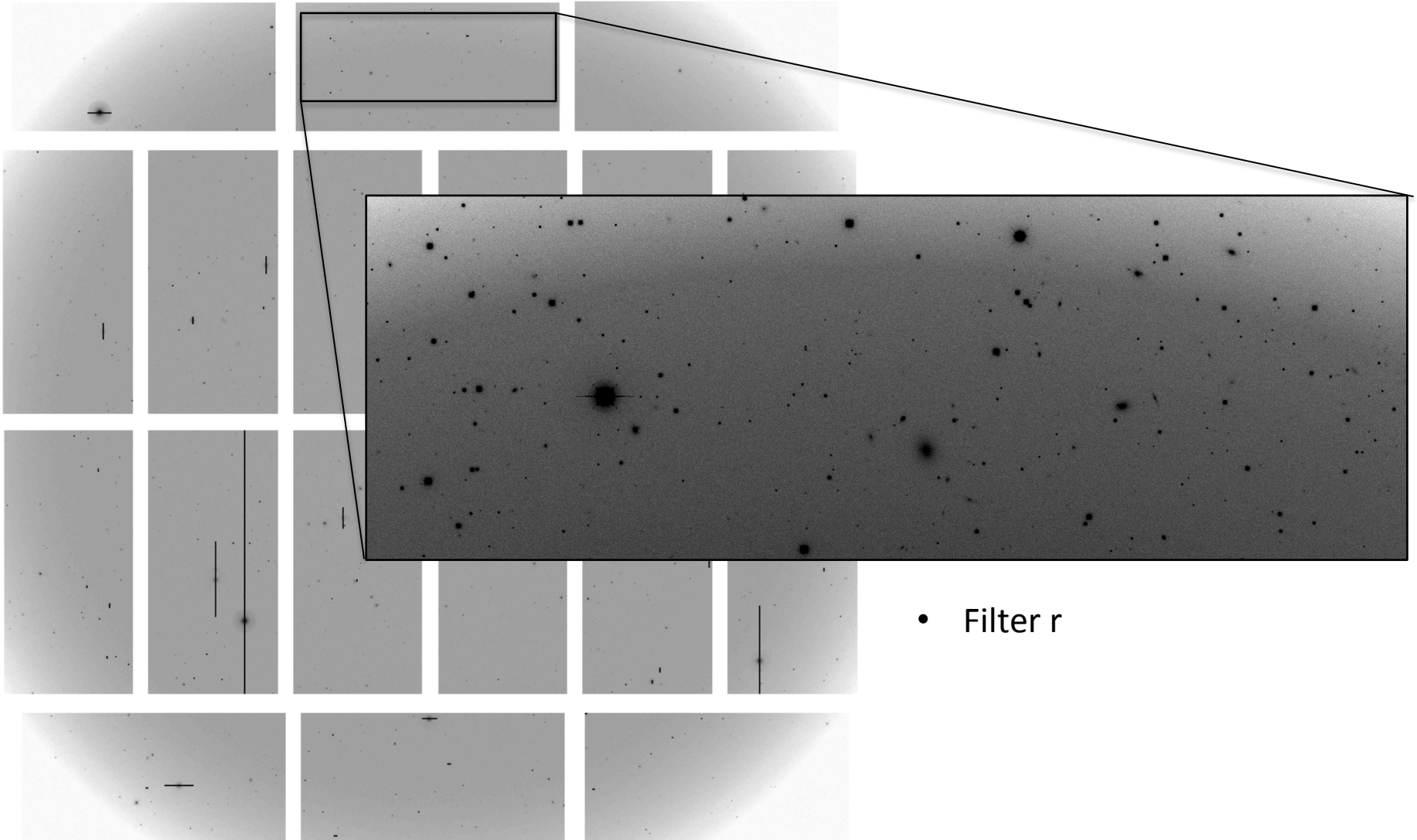- Observation Simulation (ObsSim)

- Exposure Simulation (ExpSim)

Instrument and survey specified by configuration files

SDSS Database
USNO Database
Besançon Milky Way Model
MICE/COSMOS Catalog

input

catSim.py

output

euclid_EXT.db
(local objects database)

input

obsSim.py

output

targets.yaml
(target list, exposure time, date of observation, etc)

input

**for target in targets :
expSim.py**

output

simulated FITS images

Simulated Images (PAU survey)

- Filter g
- Mosaic 18 CCD
- Each CCD = 2048 x 4176 pixels
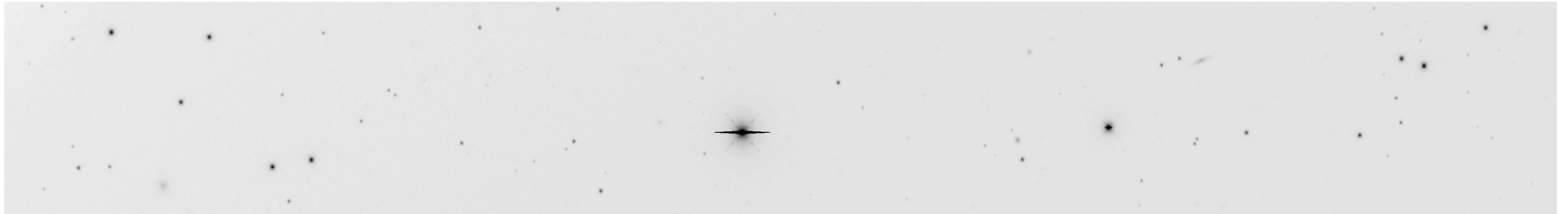- 4 amplifiers / CCD

Simulated Images (PAU survey)
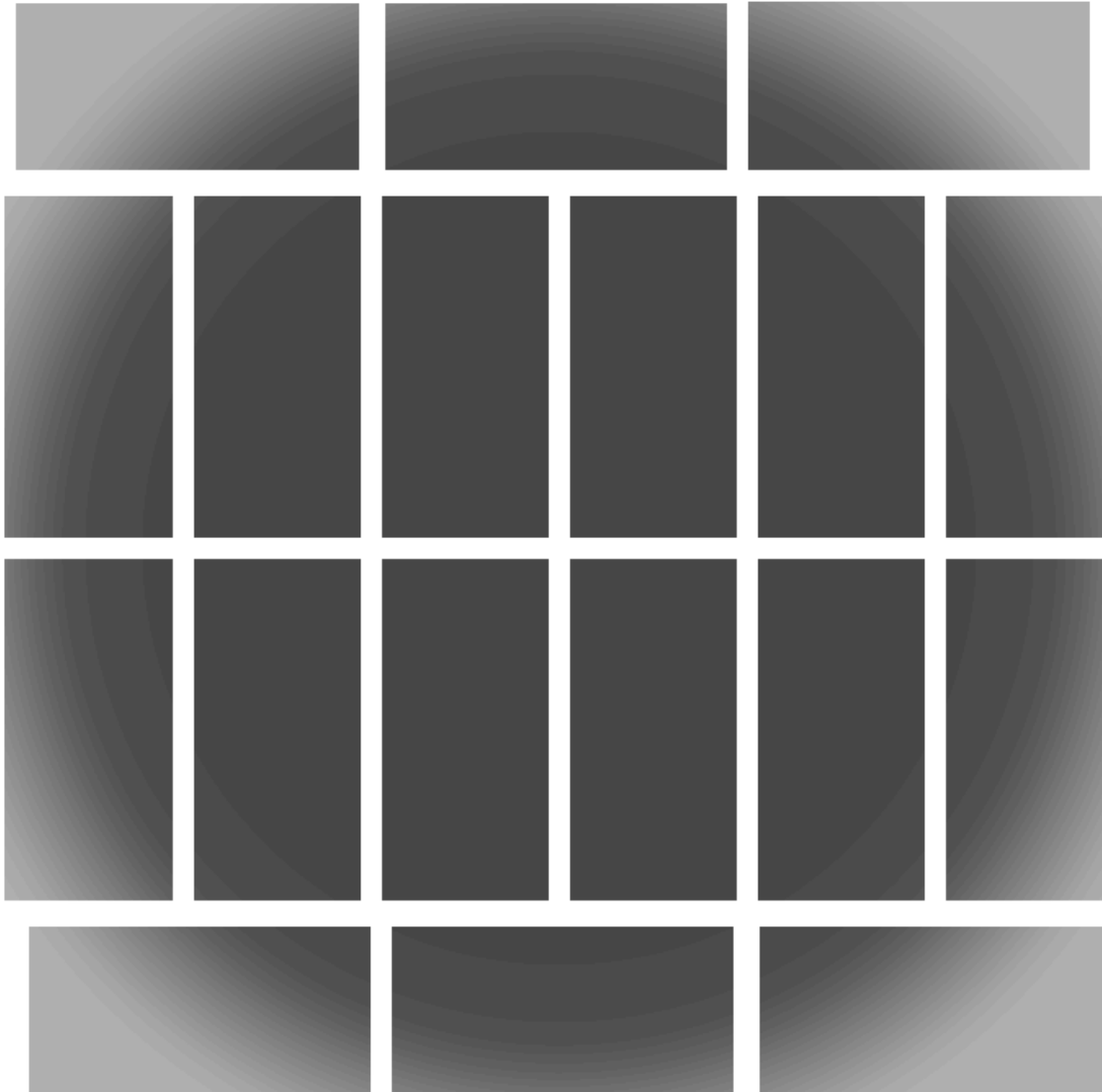

- Filter r

EXT Simulator

- Running in Lyon at CC-IN2P3
- On-going work/open issues
  - Developing configuration file for DES
  - Scaling for production runs
  - Exchange format within EXT
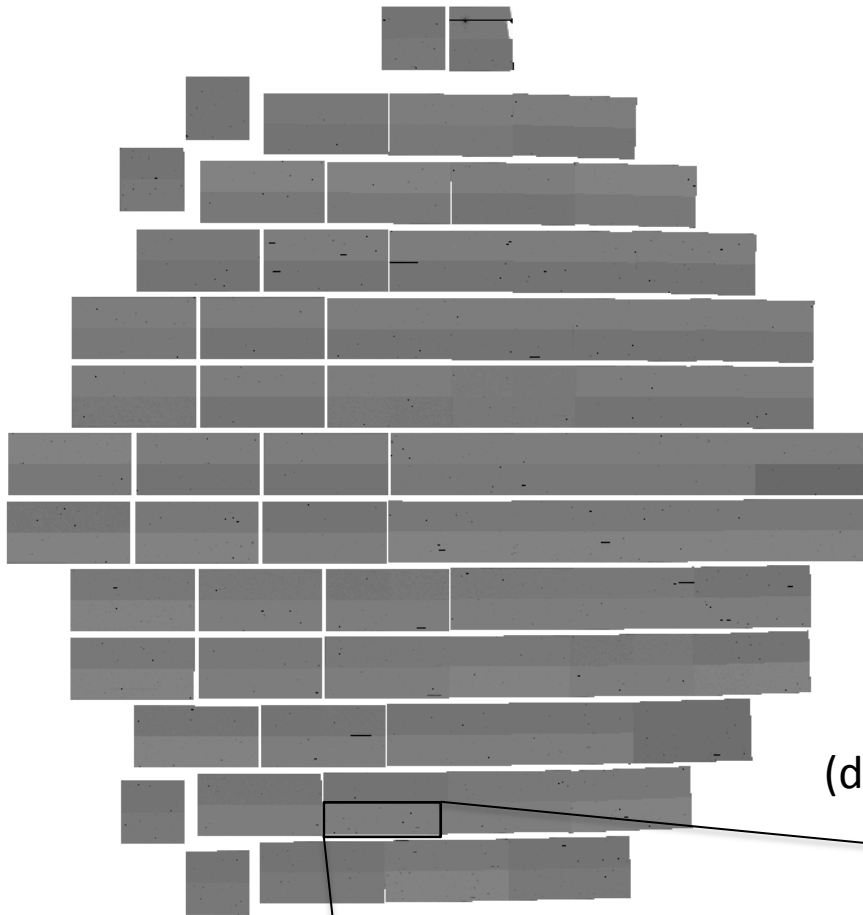 - Coordination with Euclid data simulations

Backup Slides
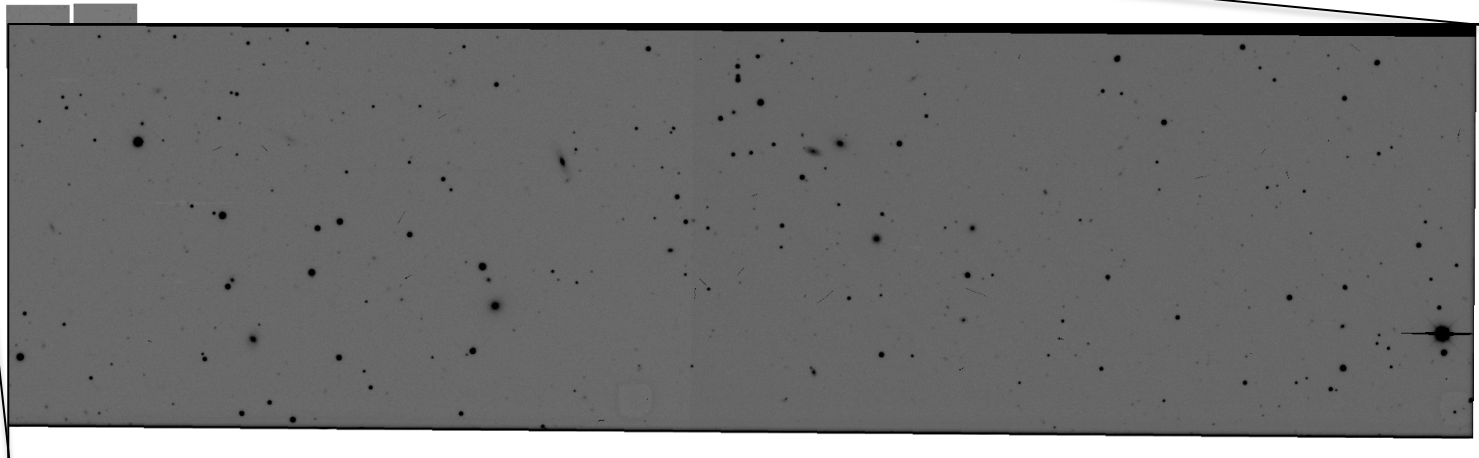
Simulated flats and biases

- By now, flats only includes vignetting
- Biases not yet modeled
- Improvements are coming

Simulation of DES data

- Sixty two 2048 x 4096 CCDs
- Four 2048 x 2048 guider CCDs
- Eight 2048 X 2048 focus and alignment CCDs
- Modifications needed to adapt the code (work in progress)

(decam public data)

Configuration files

The code is configured via a set of yaml files :

- **common.yaml** : general parameters of the calculation (paths, logs, etc).

- **pixelsim.yaml** : configuration of the pipeline itself (steps to execute, nights, filters, etc)

- **<instrument>/general.yaml** : configuration of the instrument (pixel scale, CCD layout, etc)

CatSim.py

(Stars)

Connect to online databases and downloads the objects included in the sky regions defined by user (variable FIELDS).

- Brightest stars : USNO database

- Mid-bright : SDSS database

- Faintest stars : Besançon model

(Galaxies)

Mock catalog based on a large N-body simulation (MICE http://maia.ice.cat/mice/).

Magnitudes in instrument filters are computed and final object list is stored in local database euclid_EXT.db (table *truth_objects*)

ObsSim.py

Divided in two steps :

- Survey scheduler :
  - Split the FIELDS in targets (= sky area covered by the instrument)
  - Stores targets in local DB (table *target*)
- Survey planner :
  - Given the observation nights defined by user and the visibility of the targets, attribute an observation date to the latter targets
  - Stores these information in file targets.yaml

ExpSim.py

For each exposure (target in targets.yaml) :

- Initialize the mosaic image; write required FITS keywords to the header.

- Read the star and galaxy catalogs from the database for the sky area covered by this exposure.

- For each CCD in the focal plane, call *skymaker* to create an image using our object catalogs and background level.

- If desired, split the CCD image into 4 amplifier sections.

- Add the result as an image extension to the focal plane mosaic image.