Rubin LSST-France, CPPM Marseille, 10-12/06/2024

lundi 10 juin 2024 - mercredi 12 juin 2024

CPPM

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Stellar Population Synthesis & templates for photometric redshifts

Auteur: joseph chevalier[1]

Co-auteurs: JOHANN COHEN-TANUGI [2]; Reza Ansari [3]; Sylvie Dagoret [4]

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I will present the continuation of our work on photometric redshifts using templates derived from observed spectra, extended using Stellar Population Synthesis methods.
The prospects of this work - and potential for improvement - for future studies will be presented and discussed during the talk.

Science talks / **2**

Source photo- and morpho-metry with SourceXtractor++ in Euclid ERO data

Auteur: Raphael Gavazzi[1]

[1] *LAM CNRS*

Auteur correspondant raphael.gavazzi@lam.fr

I will present some results from the Euclid Early Release Observations obtained in the field of the lensing cluster A2390 in order to highlight the merits of model photometry and morphometry using SourceXtractor++ code.

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CCOB Narrow Beam EOTest ghosts analysis for alignment

Auteur: Johan Bregeon[1]

[1] *IN2P3 LSPC*

Auteur correspondant bregeon@in2p3.fr

I'll present results of the analysis of narrow beam electro-optical tests for the alignment of the camera optics.

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Surrogate M1M3 dynamic tests

Auteurs: Andrea JEREMIE[1]; Dominique BOUTIGNY[2]

[1] *LAPP-CNRS/IN2P3-Univ. de Savoie-Mont-Blanc*

[2] *LAPP*

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The M1M3 glass mirror is now on site and has been installed on its cell and coated. Before installing the M1M3 glass mirror on the Rubin telescope, we proceeded to confirm the safety of the glass using a surrogate mirror on the telescope mount, and to verify accordance with specifications. Designed to be used for tests, the surrogate has similar mechanical properties as the glass mirror, such as mass, centre of gravity, and geometry.

The M1M3 steel surrogate was installed on the cell and on the telescope mount (TMA) in May 2023. The cell was fully equipped with the force actuators, hardpoints and various monitoring sensors. An extensive dynamic testing campaign took place until February 2024, when the surrogate and cell were dismounted from the TMA for the reception of the M1M3 glass mirror.

The test campaign was configured to validate the safe and dynamic telescope capabilities.

We also checked the position repeatability before and after a slew for different azimuth, elevation and speeds. We also investigated possible M1M3 surrogate vibrations due to the Fan Coil Units (FCU), which could have an impact on image quality.

Analysis was done on data taken during this period with dedicated dynamic tests. However, more data will be needed for the vibration analysis.

Results show that the position repeatability is almost within specifications, and that vibrations due to FCUs can be neglected.

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Impact of blending on weak lensing measurements with Rubin-LSST

Auteur: Manon Ramel[1]

[1] *LPSC / IN2P3*

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Upcoming deep optical surveys, such as the Vera C. Rubin Observatory Legacy Survey of Space and Time (LSST), will scan the sky to unprecedented depths, detecting billions of galaxies. However, this amount of detections will lead to the apparent superposition of galaxies in the images, a phenomenon known as blending, that can affect the accurate measurement of individual galaxy properties. In particular, galaxy shapes play a crucial role in estimating the masses of large-scale structures, such as galaxy clusters, through weak gravitational lensing.

This talk introduces a new catalog matching algorithm, friendly, designed for detecting and characterizing blends in simulated LSST data for the Dark Energy Science Collaboration (DESC) Data Challenge 2. The aim of this algorithm is to combine several matching procedures, as well as a probabilistic method to quantify blended systems.

By removing the resulted 27% of galaxies affected by blending from the dataset, we demonstrate that the amplitude of the excess surface mass density $\Delta\Sigma$ weak lensing profile —potentially biased low due to blending —may be partially corrected.

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DC2 bright stars masks

Auteur: Nathan Amouroux[None]

Auteur correspondant nathan.amouroux@lapp.in2p3.fr

The presence of bright objects, notably stars, represents a significant challenge in extracting valuable insights from LSST data. Bright objects will cause the saturation of LSST's sensors and will bias both object detection and flux measurement in a radius which depends on the magnitude. The creation of masks to cover the most affected regions by bright stars is necessary but challenging due to the difficulty in identifying and characterizing those objects. Our work is based on the HSC-SSP method and is applied to the DC2 object catalog. The resulting masks cover about two percent of the DC2 footprint. The impact of these masks is currently being studied in DESC in the context of galaxy cluster detection algorithms such as AMICO and redMaPPer.

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The DESC cluster weak lensing mass library v2.0

Auteur: Michel Aguena[1]

Co-auteur: Marina Ricci

[1] *APC*

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Accurate cluster mass estimates are vital for constraining cosmology with galaxy cluster abundance, one of the primary cosmological probes on LSST. We present here the second version of the Cluster Mass Modeling (CLMM) library, developed for the Dark Energy Science Collaboration (DESC), for calibrating cluster masses based on the weak lensing signal of background galaxies. This library is being developed by a large group of young career scientists with complete documentation and automatic testing, which makes the assumption of the computations transparent and the results reproducible. The new version of CLMM includes the functions for stacking clusters and more flexibility for different formats of photometric redshift inputs besides further implementations on the theoretical modeling and data operations.

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Search for dark matter halos in the milky way with stellar streams detected by the Rubin/LSST observatory

Auteurs: Marine Kuna[1]; Matthieu Pelissier[None]

[1] *UGA / LPSC*

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Introduction of the French involvement in the DESC official project aiming at connecting observable properties of stellar streams observed with Rubin/LSST to dark matter constraints. Presentation of the analysis preparation examining the impact of dark matter subhalos with masses ranging from 10^6 to 10^8 solar masses on simulated stellar streams

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Search for Orphan GRB Afterglows in Rubin LSST data

Auteur: Marina Masson[1]

[1] *LPSC*

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Orphan gamma-ray burst afterglows are good candidates to learn more about the GRB physics and progenitors or for the development of multi-messenger analysis with gravitational waves. Our objective is to identify orphan afterglows in Rubin LSST data, by using the characteristic features of their light curves. We present here the performance of our machine learning filter as implemented in the Fink broker and tested on the ELAsTiCC data set and our own simulations of orphan afterglows.

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A Cohesive Deep Drilling Field Strategy for LSST Cosmology

Auteur: Philippe Gris[1]

[1] *LPCA*

Auteur correspondant philippe.gris@clermont.in2p3.fr

This presentation will summarize a work recently achieved in DESC about the design of a cohesive DDF strategy fulfilling requirements from PZ, WL, SNe Ia and accounting for the SCOC recommendations.

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Rubin LSST data access and analysis via the Rubin Science Platform, an overview.

Auteurs: Fabio Hernandez[1]; Gabriele Mainetti[1]; Quentin Le Boulc'h[1]

[1] *CC-IN2P3*

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In this presentation, we will describe how to access Rubin data using the Rubin Science Platform (RSP). We will cover the general features of the RSP: the notebook aspect for the interactive analysis and the portal aspect to inspect catalogs and images.
Finally, we will describe the different data accessible through three different instances of the RSP (USDF, CC-IN2P3 and IDF).

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Towards Enabling Automatically Differentiable and distributed Particle-Mesh N-Body simulations

Auteurs: Alexandre Boucaud[1]; Francois Lanusse[2]; Wassim KABALAN[3]

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A series of recent works has highlighted the potential of so-called full-field cosmological inference for the analysis of upcoming weak lensing and galaxy clustering surveys, with the promise of being able to access the non-gaussian information contained in the data. However, these approaches require a differentiable forward model of the large scale structure, which currently constitutes one of the main bottlenecks, as none of the publicly available differentiable N-body codes support large-scale distribution necessary for large cosmological volumes.

To address this, we introduce JAXPM, a JAX-powered library that facilitates multi-GPU and multi-node Particle-Mesh N-body simulations. Leveraging the capabilities of a low-level CUDA distributed computing library, JaxPM allows for the first time the simulation of the entire cosmological volume observed by LSST down to Mpc resolution with an automatically differentiable simulation code. We will present our early scaling tests of this approach on the Jean-Zay GPU supercomputer.

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Cosmic Shear Simulations for Higher-Order Statistics

Auteur: Juan Mena Fernandez[1]

Co-auteur: Cyrille Doux [1]

[1] *LPSC*

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Our main goal is to provide with new cosmic shear and LSS simulations that can be used for the analysis of LSST Y1 data with Higher-Order Statistics. In this presentation, we make an update on the status of the project.

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Updates from the Fink-broker

Auteurs: Anais Moller[1]; Emille Ishida[2]; Julien Peloton[3]

[1] *Swinburne University*

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In this talk, I will describe the most recent updates from the Fink broker, describe the recent developments following the Fink-Brazil Workshop and highlight the actions done towards preparing Fink for the arrival of LSST data.

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YOLO-CL cluster detection in the Rubin/LSST DC2 simulations

Auteurs: Dominique Boutigny[1]; Kirill Grishin[2]; Michel Aguena[3]; Simona Mei[None]; Stéphane Ilic[4]

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Galaxy clusters serve as powerful probes for cosmological models. Upcoming large-scale optical and infrared surveys will reach unprecedented depths across extensive areas, necessitating highly complete and pure cluster catalogs with well-defined selection functions. We have developed a novel cluster detection algorithm called YOLO-CL. This algorithm is a modified version of the state-of-the-art object detection deep convolutional network YOLO, specifically optimized for galaxy cluster detection (Grishin, Mei, Ilic 2023). It has been adapted to the datasets from the forthcoming LSST by training on a combined sample of observed SDSS clusters and simulated galaxy cluster images from the DESC Data Challenge 2 (DESC DC2).

The YOLO-CL cluster catalog achieves 100% and 94% completeness for halo masses $M_{200c} > 10^{14.6} M_\odot$ at $0.2 < z < 0.8$, and $M_{200c} > 10^{14} M_\odot$ with redshifts z
$lesssim 1$, respectively, with only a 6% false positive rate. Additionally, we found that the YOLO-CL selection function is nearly flat with respect to halo mass within the range 0.2
$lesssim z$
$lesssim 0.9$. Our paper detailing the performance of YOLO-CL on DESC DC2 simulated images (Grishin, Mei, Ilic, Aguena, Boutigny et al.) has been submitted for internal review within the DESC collaboration.

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The Rubin Galaxies Science Collaboration

Auteur: Simona Mei[None]

Auteur correspondant mei@apc.in2p3.fr

We will present the Rubin Galaxies Science Collaboration, show recent activities and results and explain how to apply for membership.

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Effect of Photo-z Performance on Clusters

Auteur: Rance Solomon[1]

[1] *LAPP*

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Photo-z's are a key component for some of the current DESC cluster finders, AMICO and WaZP. In this talk we discuss the effect of photo-z performance on WaZP cluster detection using the new TPZ produced photo-z catalog. We also explore the possibility of optimizing the photo-z training set towards "cluster-focused" samples.

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Welcome!

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News from Rubin and DESC

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Lightning talks

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Euclid/Rubin Derived Data Product Implementation Working Group

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Flash talks

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Discussion

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EDIM committee

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LSST-France communication

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Feedback from LSST-France focal plane commissioning workshop at LAPP, Annecy

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Camera and commissioning news

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Computing news

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Clusters

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Science validation and commissioning

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Update on the LePHARE photometric redshift code

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