

Kick off TOSCA meeting

Rapport sur les contributions

ID de Contribution: 1

Type: **Non spécifié**

Introduction from all participants

jeudi 13 avril 2023 09:15 (30 minutes)

1 slide each, same format, including name/expertise/WP in which they plan to be involved. This info will be needed for the website.

ID de Contribution: 2

Type: **Non spécifié**

Work Package 1: from visibilities to galaxy shapes (André Ferrari)

jeudi 13 avril 2023 09:45 (30 minutes)

We will build catalogues of individual galaxy shapes, which will be used as the inputs for WP2.
PhD in Nice.

Supervisor(s): André Ferrari + Simon Prunet

Collaborators: Cédric Richard, Jean-Luc Starck, Sam Farrens

ID de Contribution: 3

Type: **Non spécifié**

Work Package 2 - from shapes to convergence maps (Jean-Luc Starck)

jeudi 13 avril 2023 10:15 (30 minutes)

We will use Deep Learning for dark matter mass map reconstruction, either from radio WP1 inputs or from an optical shape catalogue such as Euclid.

1 Postdoc working with: Jalal Fadili, Jean-Luc Starck

Collaborators: Sam Farrens and Francois Lanusse

ID de Contribution: 4

Type: **Non spécifié**

Work Package 3: synergy and cosmological parameters

jeudi 13 avril 2023 11:15 (30 minutes)

1 Postdoc (3 yeras)

Collaborators: Martin Kunz, Martin Kilbinger

Orateur: PETTORINO, Valeria (CEA Paris-Saclay, Departement of Astrophysics, CosmoStat Lab)

ID de Contribution: 5

Type: **Non spécifié**

General questions, if any

jeudi 13 avril 2023 11:45 (15 minutes)

ID de Contribution: 6

Type: **Non spécifié**

SKAO Science Data Processor (Shan Mignot)

SKA computing challenge and on-going developments

ID de Contribution: 7

Type: **Non spécifié**

tbd (Simon Prunet)

jeudi 13 avril 2023 14:00 (30 minutes)

ID de Contribution: **8**

Type: **Non spécifié**

tbd (Sam Farrens)

ID de Contribution: 9

Type: **Non spécifié**

tbd (Jean-Luc Starck)

ID de Contribution: **10**

Type: **Non spécifié**

Francois Lanusse

ID de Contribution: **11**

Type: **Non spécifié**

Benjamin Remy

ID de Contribution: 14

Type: **Non spécifié**

Unbiased shear estimation with forward modeling

jeudi 13 avril 2023 16:30 (30 minutes)

As the volume and quality of modern galaxy surveys increase, so does the difficulty of measuring the cosmological signal imprinted in galaxy shapes. Weak gravitational lensing sourced by the most massive structures in the Universe generates a slight shearing of galaxy morphologies called cosmic shear, key probe for cosmological models. Modern techniques of shear estimation based on statistics of ellipticity measurements suffer from the fact that the ellipticity is not a well-defined quantity for arbitrary galaxy light profiles, biasing the shear estimation. I will present how a hybrid physical and deep learning Hierarchical Bayesian Model, where a generative model captures the galaxy morphology, enables us to recover an unbiased estimate of the shear on realistic galaxies, thus solving the model bias. (<https://arxiv.org/abs/2210.16243>)

Auteur principal: REMY, Benjamin (CEA Paris-Saclay)

Orateur: REMY, Benjamin (CEA Paris-Saclay)

ID de Contribution: 15

Type: **Non spécifié**

Weak Lensing Mass Mapping in the Context of Cosmological Inference

jeudi 13 avril 2023 16:00 (30 minutes)

In this review talk I will present the state of the art in the field of weak lensing mass-mapping, as well as discuss the important and desirable properties in the perspective of performing cosmological inference.

Specifically, I will review the most advanced mass-mapping method to date (Remy et al. 2022) which was shown to enable proper sampling of the full Bayesian posterior of the mass-mapping problem, using a combination of physical priors and Diffusion Models.

But I will also detail how mass-mapping is only one intermediate stage of a problem when concerned with constraining cosmological parameters, and demonstrate that mass-mapping is not actually required with Simulation-Based Inference techniques, which directly extract the full information content from the shear field itself.

Auteur principal: LANUSSE, Francois ({CNRS}UMR7158)

Co-auteur: REMY, Benjamin (CEA Paris-Saclay)

Orateur: LANUSSE, Francois ({CNRS}UMR7158)

ID de Contribution: 16

Type: **Non spécifié**

The ARGOS Project

jeudi 13 avril 2023 14:30 (30 minutes)

In this talk I will introduce the ARGOS project, a concept for a leading-edge, low-cost, sustainable “small-D, big-N” radio interferometer to be constructed in Crete. I will provide an overview of the current plans for building the interferometer as well as explaining how ARGOS aims to bring the radio regime into the era of multi-messenger astronomy by probing the nature of transient sources, such as Fast Radio Bursts (FRBs). Finally, I will present the challenges of reconstructing radio interferometric data and how CosmoStat aims to use state-of-the-art signal processing and machine learning tools to address them.

Auteur principal: FARRENS, Samuel (CosmoStat, CEA Paris-Saclay)

Orateur: FARRENS, Samuel (CosmoStat, CEA Paris-Saclay)

ID de Contribution: 17

Type: **Non spécifié**

Astronomical Image Deconvolution : From Wavelets to Deep Learning

jeudi 13 avril 2023 15:30 (30 minutes)

We will present an overview of our recent work in the last years, in the context of astronomical image deconvolution. We will address both the case optical and radio galaxies deconvolution.

Auteur principal: STARCK, Jean-Luc (CosmoStat, CEA Paris-Saclay)

Orateur: STARCK, Jean-Luc (CosmoStat, CEA Paris-Saclay)

ID de Contribution: 18

Type: Non spécifié

SKA: Overview of the Data Processing Challenges and Development of the Science Data Processor

jeudi 13 avril 2023 13:30 (30 minutes)

Radio-telescopes fundamentally rely on massive data processing to form observables after the radio waves have been digitized. For the SKA telescopes, the number of antennas and of frequency channels lead to considerable amounts of raw data which first need to be combined to form beams or visibilities so that temporal or spatial data reduction can be carried out to form data products that scientists can ultimately analyse. The design for the SKA relies on a number of processing facilities in the field, at a national scale and worldwide with specific requirements in terms of data flow, power, diversity of tasks and accessibility. This talk will describe SKA's overall computing design and then focus on the Science Data Processors where data reduction occurs in the light of delivering high performance computing at an unprecedented scale and in a context which is not that of an HPC project.

Auteur principal: Dr MIGNOT, Shan (Université Côte d'Azur, CNRS, OCA, Laboratoire Lagrange)

Orateur: Dr MIGNOT, Shan (Université Côte d'Azur, CNRS, OCA, Laboratoire Lagrange)