Colloque national Action Dark Energy 2023 - 7ème édition

Rapport sur les contributions

ID de Contribution: **1**   Type: **Non spécifié**

Welcome / Accueil

lundi 6 novembre 2023 09:20 (10 minutes)

Orateur: BLANCHARD, Alain (IRAP , OMP)

ID de Contribution: **79** Type: **Invité**

FINAL ACT

mardi 7 novembre 2023 14:00 (30 minutes)

Between 2017 and 2022, the Atacama Cosmology Telescope observed 40% of the sky at arcminute resolution, approximately four times the angular resolution of the Planck satellite. In my presentation, I will discuss recent results based on this data, focusing particularly on the high signal-to-noise measurement of the Cosmic Microwave Background (CMB) lensing field. Additionally, I will elaborate on the upcoming public data release, ACT DR6. When combined with Planck data, this release is expected to provide the most accurate cosmological constraints on the Lambda Cold Dark Matter (LCDM) parameters to date.

Orateur: LOUIS, Thibaut (LAL)

Classification de Session: Review and contribution talks

ID de Contribution: **81**   Type: **Invité**

Impact of future data to constrain theoretical models

lundi 6 novembre 2023 16:30 (30 minutes)

Orateur: KUNZ, Martin

Classification de Session: Review and contribution talks

ID de Contribution: **82**   Type: **Invité**

Relativistic effects on large scale structures: a leap into the non-linear regime with RayGal simulations

lundi 6 novembre 2023 15:30 (30 minutes)

Orateur: RASERA, Yann (LUTH/Obs. de Paris/Univ. de Paris)

Classification de Session: Review and contribution talks

ID de Contribution: **83** Type: **Invité**

GR effects on LSS

lundi 6 novembre 2023 14:00 (30 minutes)

Orateur: BONVIN, Camille (University of Geneva)

Classification de Session: Review and contribution talks

ID de Contribution: **84**   Type: **Invité**

ZTF DR2

lundi 6 novembre 2023 11:00 (30 minutes)

Orateur: Dr RIGAULT, Mickael (IP2I)

Classification de Session: Review and contribution talks

ID de Contribution: **86**   Type: **Invité**

Sociology of Dark Energy

lundi 6 novembre 2023 09:30 (30 minutes)

Orateur: LAHAV, Ofer (University College London)

Classification de Session: Review and contribution talks

ID de Contribution: **87**   Type: **Non spécifié**

Testing gravity through the distortion of time

lundi 6 novembre 2023 14:30 (20 minutes)

The distribution of galaxies provides an ideal laboratory to test deviations from General Relativity. In particular, constraints on gravity modifications are commonly obtained by measuring the growth of cosmic structures through redshift-space distortions. However, such constraints rely on the validity of the weak equivalence principle, which has never been tested for the dark matter component. In my talk, I will employ data from the Sloan Digital Sky Survey to show that dropping this restrictive assumption leads to severe degeneracies and makes it challenging to distinguish fundamental gravity modifications from interactions in the dark sector. Luckily, I will demonstrate that it is possible to break such degeneracies and recover tight constraints thanks to measurements of the distortion of time expected from upcoming galaxy surveys.

Auteur principal: CASTELLO, Sveva (University of Geneva)

Orateur: CASTELLO, Sveva (University of Geneva)

Classification de Session: Review and contribution talks

ID de Contribution: **89** Type: **Non spécifié**

DESI Y1 Full-Shape pipeline

mardi 7 novembre 2023 09:50 (20 minutes)

Orateur: ZARROUK, Pauline (LPNHE)

Classification de Session: Review and contribution talks

ID de Contribution: **91**   Type: **Non spécifié**

DAMIC at SNOLAB

lundi 6 novembre 2023 10:00 (30 minutes)

Orateur: DE DOMINICIS, Claudia

Classification de Session: Review and contribution talks

ID de Contribution: **97**   Type: **Non spécifié**

Numerical investigation of screened scalar-tensor theories in space-based experiments

mardi 7 novembre 2023 15:10 (20 minutes)

Scalar fields appear in most of the extensions beyond the standard models and are key ingredients in cosmology phenomenology to unveil the dark sector. Among the wide variety of scalar-tensor models proposed over the past decades, some are already ruled-out by lab experiments or astrophysical observations while others remain viable by means of screening mechanisms that dynamically suppress deviations from general relativity in classical fifth force searches. The hunt for such hypothetical scalar fields thus requires designing novel and intelligent experiments. Alas, this task is partly impeded by the difficulty to accurately model their effects in complex setups.

This talk will showcase *femtoscope* —a Python numerical tool based on the finite element method for solving Klein-Gordon-like equations that arise in particular in the symmetron or chameleon models. The novelty and most important feature of *femtoscope* is that it includes a careful treatment of asymptotic boundary conditions. I will then discuss some recent numerical studies conducted in order to ascertain fifth force detectability by means of space geodesy techniques in a realistic environment.

Auteur principal: LÉVY, Hugo (ONERA / IAP)

Co-auteurs: BERGÉ, Joel (ONERA);   Dr UZAN, Jean-Philippe (IAP)

Orateur: LÉVY, Hugo (ONERA / IAP)

Classification de Session: Review and contribution talks

ID de Contribution: **98**   Type: **Non spécifié**

Host dependency of the supernovae standardisation with the ZTF volume limited DR2 Cosmo sample

lundi 6 novembre 2023 11:30 (20 minutes)

I will present briefly the ZTF DR2 sample. I will then present the SNe stretch and colour distributions, as well as the standardisation process used to make SNe cosmology ready, and how those depend on SN host.

Auteur principal: GINOLIN, Madeleine (IP2I/IN2P3/CNRS)

Orateur: GINOLIN, Madeleine (IP2I/IN2P3/CNRS)

Classification de Session: Review and contribution talks

ID de Contribution: **99**   Type: **Non spécifié**

DESI Early Data Release and physics highlights

mardi 7 novembre 2023 09:00 (30 minutes)

In this presentation, I will give a status report on the Dark Energy Spectroscopic Instrument (DESI) and focus on the Early Data Release that happened in April 2023. I will present the results of a selection of the papers that were published with some emphasis on the HOD characterisation of DESI tracers.

DESI is a Large scale redshift survey of 40 million galaxies and quasars over 14000 squared degrees that aims at constraining the nature of dark energy and test general relativity through the measurement of the history of the expansion of the universe up to redshift 2.5 and the measurement of the linear growth rate of structures up to redshift 2.1.

Auteur principal: BURTIN, Etienne (IRFU/CEA - Université Paris-Saclay)

Co-auteurs: ROCHER, Antoine (CEA Saclay); Dr RUHLMANN-KLEIDER, Vanina (CEA-Saclay/Irfu/DPhP)

Orateur: BURTIN, Etienne (IRFU/CEA - Université Paris-Saclay)

Classification de Session: Review and contribution talks

ID de Contribution: **100**   Type: **Non spécifié**

Anticorrelating void and peak galaxies with marked CF to pin down modified gravity

lundi 6 novembre 2023 15:10 (20 minutes)

Modified gravity (MG) as an alternative model to the cosmological constant is very appealing in resolving issues in the ΛCDM paradigm. To comply with general relativity (GR) in high density regions many MG theories exhibit a screening mechanism suppressing the fifth force to recover GR thereby imprinting an environmental dependency into the theory on a fundamental level.

Recent developments have shown that marked correlation functions are a promising statistic to distinguish between screened modified gravity and GR where the unweighted correlation function fails to do so. This is made possible by using, among others, the density field as a mark to upweigh galaxies residing in low density regions where MG effects are expected to be pronounced leading to an increase in their statistical contribution.

We undertook an extended investigation of marks utilising environmental information from the T-Web classification as well as the density field in particular creating anti-correlation by allowing the mark to switch signs. The latter is found to produce significant differences measured in simulations of $f(R)$ gravity up to intermediate above 40Mpc/h both in real space and in the monopole in redshift space. This might enable more efficient modelling in the future hence rendering marked correlation functions are viable tool to detect modified gravity in observations.

Auteur principal: KAERCHER, Martin

Co-auteurs: BEL, Julien (CPT);   DE LA TORRE, Sylvain (LAM)

Orateur: KAERCHER, Martin

Classification de Session: Review and contribution talks

ID de Contribution: **101**   Type: **Non spécifié**

Theoretical ℓ1-norm from one-point PDF prediction

mardi 7 novembre 2023 15:30 (20 minutes)

Abstract

The phenomenon of light deflection due to the presence of massive objects is called gravitational lensing, which leads to the distortion of the observed images of these distant galaxies. These distortions are usually very small and can be detected only by averaging over a huge number of galaxies. This regime is what we call weak lensing. Weak gravitational lensing serves as a major tool in unraveling the universe's large-scale structure. One of the key focuses of upcoming surveys is quantifying non-Gaussianities. Traditional two-point statistics fall short in capturing these non-Gaussian features, necessitating the adoption of higher-order statistics. However, a missing piece of the puzzle is a robust theoretical framework.

One of the higher-order statistics methods that enables us to extract the non-Gaussian information from cosmic shear surveys is by using the one-point probability density functions. In a significant step forward, recent work by [Barthelemy et al. 2021] introduced a theoretical prescription to obtain the one-point probability density function based on the large deviation principle. Building upon this foundation, our study extends the theoretical framework to provide, for the first time, predictions for the ℓ1-norm. Previous work by [Ajani et al. 2021] has shown that ℓ1-norm performs better than the power spectrum by a considerable margin. With this work now have a theoretical prediction for the ℓ1-norm. We also explore the cosmological dependence of this statistic and validate our findings using simulations.

Our results demonstrate that the theoretical predictions of the aperture mass ℓ1-norm align remarkably well with existing simulations, accurately capturing the non-Gaussian information. Furthermore, our work sheds light on the cosmological implications of these findings, paving the way for more precise and informed cosmological investigations.

References

Ajani, Virginia, Jean-Luc Starck, and Valeria Pettorino (Jan. 2021). "Starlet ℓ1-norm for weak lensing cosmology". In: 645, L11, p. L11. doi: 10.1051/0004-6361/202039988. arXiv: 2101.01542 [astro-ph.CO].

Barthelemy, Alexandre, Sandrine Codis, and Francis Bernardeau (Mar. 2021). "Probability distribution function of the aperture mass field with large deviation theory". In: Monthly Notices of the Royal Astronomical Society 503.4,

Auteur principal: Mlle TINNANERI SREEKANTH, Vilasini (CosmoStat, CEA Paris-Saclay)

Co-auteurs: Dr CODIS, Sandrine (AIM/CNRS); Dr BARTHLEMY, Alexandre (Universitäts-Sternwarte, Fakultät für Physik, Ludwig-Maximilians-Universität München, Scheinerstraße 1, 81679 München, Germany); Dr STARCK, Jean-Luc (CosmoStat, CEA Paris-Saclay)

Orateur: Mlle TINNANERI SREEKANTH, Vilasini (CosmoStat, CEA Paris-Saclay)

Classification de Session: Review and contribution talks

ID de Contribution: **102**   Type: **Non spécifié**

Cosmic shear estimation method based on galaxies images second moments

mardi 7 novembre 2023 11:40 (20 minutes)

Shear estimation began in 1995 with the KSB proposal which essentially consists of using a combination of the second moments of the observed image of the galaxy and the PSF. Numerous other methods have been proposed over the years, and in most cases, the measurements derived from these methods have to be corrected using simulations, and therefore depend on the assumptions of these simulations, particularly concerning galaxy and PSF profiles. Whether these methods measure shapes by maximum likelihood, or by a more or less complex combination of second moments, the corrections to be applied depend on the details of galaxy and PSF shapes. Although we use simulations, we are trying here to develop an approach that is independent of the galaxy profile and PSF, since the way the estimator depends on them is measured on the images themselves.

Auteur principal: Mlle VAN DEN ABEELE, Enya (LPNHE)

Orateur: Mlle VAN DEN ABEELE, Enya (LPNHE)

Classification de Session: Review and contribution talks

ID de Contribution: **103**   Type: **Non spécifié**

Active and Sterile Neutrino-Axion Competition in Cosmic Birefringence Angle Measurement

mardi 7 novembre 2023 14:50 (20 minutes)

Cosmic birefringence (CB) angle refers tothe rotation of the linear polarization plane of Cosmic Microwave Background(CMB) radiations when parity-violating theories areconsidered. Weanalyze the Quantum Boltzmann equation for an ensemble of CMB photonsinteracting with axion and neutrinos (active and sterile) in the presence of ascalar metric perturbation. After calculating the C_l^{EB} to drive CB, we plot thesecontributions by considering CB measurement and discuss on parametricmass-coupling space of axion and neutrino. We show that for some of the axionmass-coupling parameters, the dominant contribution (consistency with) is forneutrino and axion contribution suppresses neutrino one and vice versa. Inanother plot, we compare our results on the axion-neutrino parametric spacewith other experiments measuring the mass-coupling of axion.

Auteur principal: MOTIE, Iman (Universit de Toulouse, UPS-OMP, IRAP, CNRS, 14 Avenue Edouard Belin, F-31400 Toulouse, France)

Orateur: MOTIE, Iman (Universit de Toulouse, UPS-OMP, IRAP, CNRS, 14 Avenue Edouard Belin, F-31400 Toulouse, France)

Classification de Session: Review and contribution talks

ID de Contribution: **104**   Type: **Non spécifié**

Dark energy and string theory: an update

mardi 7 novembre 2023 14:30 (20 minutes)

Trying to obtain dark energy from string theory models is a challenge. An important activity has taken place recently: attempts to obtain a positive cosmological constant (de Sitter spacetime) have mostly failed, and the community has turned to quintessence-like scenarios. Those derived from string theory remain so far difficult to accomodate with observations.

Auteur principal: Dr ANDRIOT, David (LAPTh, CNRS)

Orateur: Dr ANDRIOT, David (LAPTh, CNRS)

Classification de Session: Review and contribution talks

ID de Contribution: **105**   Type: **Non spécifié**

Small-scale 3D Lyman-α forest power spectrum

mardi 7 novembre 2023 10:10 (20 minutes)

Small-scale correlations measured in the Lyman-α (Lyα) forest encode information about the intergalactic medium and the primordial matter power spectrum. I my talk, I will introduce a simple and fast method for measuring the 3D Lyman-alpha forest power spectrum at small scales. This measurement approach builds upon the well-established Fast Fourier Transform method used for P1D. I will present results of the method's evaluation on cosmological simulations and a proof-of-principle measurement using real data obtained from SDSS QSO spectra. The goal is to apply this measurement to the DESI Y1 data sample, and as such, I will discuss some prospects related to this.

Auteur principal: ABDUL KARIM, Marie Lynn (IRFU/DPhP CEA-Saclay)

Orateur: ABDUL KARIM, Marie Lynn (IRFU/DPhP CEA-Saclay)

Classification de Session: Review and contribution talks

ID de Contribution: **106**
Type: **Non spécifié**

Correction of fiber collisions effects in DESI Y1

mardi 7 novembre 2023 09:30 (20 minutes)

I will present a method to mitigate the effect of fiber collisions on galaxy clustering in DESI first year of data. Fiber collisions happen because the physical size of the fibers prevents us from observing two galaxies with small angular separation at the same time. Thus, for the first year of DESI observation, we are missing some galaxy pairs at small transverse separation. By removing all galaxy pairs with transverse separation below some threshold from two-point statistics (correlation function and power spectrum), in both estimators and models, we can remove the effect of fiber collisions and recover unbiased constraints on cosmological parameters from two-point measurements.

Auteur principal: PINON, Mathilde (CEA/Irfu/DPhP)

Orateur: PINON, Mathilde (CEA/Irfu/DPhP)

Classification de Session: Review and contribution talks

ID de Contribution: **107**   Type: **Non spécifié**

Implicit likelihood inference in cosmology while checking for survey systematics.

lundi 6 novembre 2023 14:50 (20 minutes)

We present methodological advances to perform implicit likelihood inference of cosmology from any forward model of galaxy surveys, while efficiently checking for systematics. The approach is based on a two-steps framework, and does not require any inner knowledge of the forward data model. First, we use SELFI (Simulator expansion for likelihood-free inference) to infer the initial matter power spectrum from any probe, and we use it to check whether all systematics are correctly accounted for based on qualitative and quantitative criteria. Second, cosmological parameters are inferred using implicit likelihood inference. Simulations used in the first step are recycled for optimal data compression, which is required for the second step. We show that mis-modelled systematic effects that would result in a biased posterior are unambiguously detected before performing the inference of cosmological parameters. The method is currently being used for Additional Galaxy Clustering probes in preparation for the first Euclid data release.

Auteur principal: HOELLINGER, Tristan (Institut d'Astrophysique de Paris)

Co-auteur: LECLERCQ, Florent (Institut d'Astrophysique de Paris)

Orateur: HOELLINGER, Tristan (Institut d'Astrophysique de Paris)

Classification de Session: Review and contribution talks

ID de Contribution: **108**   Type: **Invité**

Cosmology with the final Planck data release (PR4)

lundi 6 novembre 2023 17:00 (30 minutes)

We present constraints on cosmological parameters using maps from the last Planck data release (PR4). In particular, we detail an upgraded version of the cosmic microwave background likelihood, HiLLiPoP, based on angular power spectra and relying on a physical modelling of the foreground residuals in the spectral domain. This new version of the likelihood retains a larger sky fraction (up to 75 %) and uses an extended multipole range. Using this likelihood, along with low-l measurements from LoLLiPoP, we derive constraints on ΛCDM parameters that are in good agreement with previous Planck 2018 results, but with 10 % to 20 % smaller uncertainties. We demonstrate that the foregrounds can be accurately described in the spectral domain with only negligible impact on ΛCDM parameters. We also derive constraints on single-parameter extensions to ΛCDM including A_L, Ω_K, N_{eff}, and $\sum m_\nu$. Noteworthy results from this updated analysis include a lensing amplitude value of $A_L = 1.036 \pm 0.051$, which aligns more closely with theoretical expectations within the ΛCDM framework. Additionally, our curvature measurement, $\Omega_K = -0.012 \pm 0.010$, now demonstrates complete consistency with a flat universe, and our measurement of S_8 is closer to the measurements derived from large-scale structure surveys (at the 1.6 σ level).

Orateur: TRISTRAM, Matthieu (IJClab, CNRS, France)

Classification de Session: Review and contribution talks

ID de Contribution: **109**   Type: **Non spécifié**

A joint Planck and SPT-SZ measurement of CMB lensing cluster masses

mardi 7 novembre 2023 11:20 (20 minutes)

We present the first CMB-lensing galaxy cluster mass measurement using a combination of ground and space-based surveys (SPT-SZ and Planck). We measure the signal at 4.8 sigma, a significant gain with respect to measurements performed on the two individual datasets. In particular, we show that we take advantage of correlations between the scales observed by SPT-SZ and the scales observed by Planck to improve the constraints on the lensing potential. This result demonstrates that Planck data will remain a key element in CMB-lensing cluster studies for decades to come.

Auteur principal: M. HUCHET, Alexandre (CEA Saclay)

Orateur: M. HUCHET, Alexandre (CEA Saclay)

Classification de Session: Review and contribution talks

ID de Contribution: **110**   Type: **Non spécifié**

Amalgame: Cosmological Constraints from the First Combined Photometric Supernova Sample

lundi 6 novembre 2023 17:30 (20 minutes)

Future constraints of cosmological parameters from Type Ia supernovae (SNe Ia) will depend on the use of photometric samples, those samples without spectroscopic measurements of the SNe Ia. There is a growing number of analyses that show that photometric samples can be utilised for precision cosmological studies with minimal systematic uncertainties. To investigate this claim, we perform the first analysis that combines two separate photometric samples, SDSS and Pan-STARRS, without including a low-redshift anchor. We evaluate the consistency of the cosmological parameters from these two samples and find they are consistent with each other to under 1σ.

Auteur principal: Dr POPOVIC, Brodie (CNRS)

Orateur: Dr POPOVIC, Brodie (CNRS)

Classification de Session: Review and contribution talks

ID de Contribution: **111**   Type: **Contribué**

Field Level Inference of Voids and Galaxy Clusters

mardi 7 novembre 2023 12:00 (30 minutes)

In this talk, I will present the latest improvements on the use of field level inference for near field cosmology. We notably investigated accuracy requirements for the Hamiltonian integrator inside the BORG framework. We compare the results to an ensemble of well studied local clusters, and test the adequacy of the cluster abundance in a ΛCDM scenario.

Auteurs principaux: Prof. PONTZEN, Andrew (UCL); Dr LAVAUX, Guilhem (Institut d'Astrophysique de Paris / CNRS); Prof. PEIRIS, Hyranya (Cambridge University); Prof. JASCHE, Jens (Stockholm University); Dr STOPYRA, Stephen (Stockholm University)

Orateur: Dr LAVAUX, Guilhem (Institut d'Astrophysique de Paris / CNRS)

Classification de Session: Review and contribution talks

ID de Contribution: **112**   Type: **Non spécifié**

No tension on S8 ?

lundi 6 novembre 2023 17:50 (20 minutes)

I will discuss various methods for determining the amplitude of matter fluctuations in the recent universe. I will demonstrate that the combination of RSD (Redshift Space Distortions) and Pantheon+ data leads to a high amplitude within the ΛCDM (Lambda Cold Dark Matter) model, consistent with the CMB (Cosmic Microwave Background) data. I will present several independent datasets pointing to the same conclusion.

Auteur principal: BLANCHARD, ALAIN (IRAP , OMP)

Co-auteurs: LAMINE, Brahim (IRAP);   TUTUSAUS, Isaac (ICE/IRAP);   M. HÉLORET, Jean-Yves (IRAP, UPS, Toulouse);   ILIC, Stéphane (IJCLab)

Orateur: BLANCHARD, ALAIN (IRAP , OMP)

Classification de Session: Review and contribution talks

ID de Contribution: **113**   Type: **Non spécifié**

Screening the dilaton

lundi 6 novembre 2023 18:10 (20 minutes)

Screening the dilaton

Auteur principal: BRAX, philippe (IPHT Saclay)

Orateur: BRAX, philippe (IPHT Saclay)

Classification de Session: Review and contribution talks

ID de Contribution: **114**   Type: **Non spécifié**

Mocks for the DESI BGS

mardi 7 novembre 2023 11:00 (20 minutes)

I will present my contribution to the creation of realistic mocks for the DESI Bright Galaxy Survey. I will mainly focus on the BGS lightcones that I am producing using simulations created with the Parallel Particle-Mesh GLAM code (Klypin & Prada 2018). I will explain how I populate the dark matter halos with BGS galaxies and how I implement magnitudes and colour so that the mocks reproduce the evolution of clustering according to these physical properties. Then, I will show a comparison of the clustering of BGS GLAM mocks with other BGS mocks such AbacusSummit (Maksimova et al. 2021, Smith et al. in prep) and EZmocks that I am also producing. Eventually, as those mocks have been created in order to build covariance matrices, I will show that we can correct for the effect of replications and compare GLAM covariance matrix with other methods.

Orateur: M. TRUSOV, Svyatoslav

Classification de Session: Review and contribution talks

ID de Contribution: **115**   Type: **Non spécifié**

Photometry for SN Cosmology

lundi 6 novembre 2023 11:50 (20 minutes)

Orateur: LACROIX, Leander (LPNHE)

Classification de Session: Review and contribution talks

ID de Contribution: **116**   Type: **Non spécifié**

SN Ia and Galaxy clustering: void, cluster and fs8

lundi 6 novembre 2023 12:10 (20 minutes)

The unprecedented statistic provided by the ZTF DR2 allows us to investigate the interplay between SNIa and the Large-scale structure at low redshift. This interplay is twofold. On the one hand, the LSS provides specific density local environments for the SNIa and their host. On the other hand, the increased statistic allows us to investigate directly the peculiar velocities of SNIa at low redshift, in both the Hubble Diagram and the constraint of the growth of structure. This talk will present some ongoing analyses of the ZTF DR2 that probe the interplay between SNIa properties and extreme under or over-dense environments such as voids and clusters, as well as the ongoing studies of peculiar velocities of SNIa for cosmological constraints.

Orateur: AUBERT, Marie (LPC / CNRS / IN2P3)

Classification de Session: Review and contribution talks