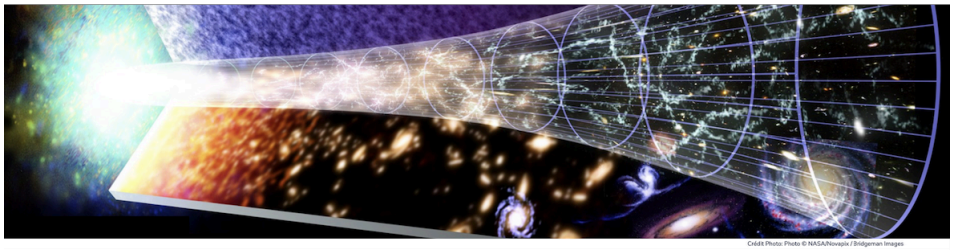
Kick-off du GDR CoPhy



Rapport sur les contributions

https://indico.ijclab.in2p3.fr/e/8881

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

Introduction et Intervention des DAS: Vincent Poireau, Martin Giard, Bertrand Georgeot

mardi 17 janvier 2023 10:30 (30 minutes)

ID de Contribution: **2** Type: **Non spécifié**

presentation the ADE WG

ID de Contribution: **3** Type: **Non spécifié**

presentation of the CMB WG

ID de Contribution: **4** Type: **Non spécifié**

presentation of TUG WG

ID de Contribution: **5** Type: **Non spécifié**

presentation of the GDR and of the WG

mardi 17 janvier 2023 11:00 (30 minutes)

ID de Contribution: **6** Type: **Non spécifié**

Status of last scientific news from the main projects in Cosmology

ID de Contribution: **7** Type: **Non spécifié**

Discussions (links with other GDR, Task forces..)

mercredi 18 janvier 2023 10:00 (1 heure)

ID de Contribution: **8** Type: **Non spécifié**

Magrathea-Pathfinder: a 3D adaptive-mesh code for geodesic ray tracing in N-body simulations

mardi 17 janvier 2023 15:30 (30 minutes)

Orateur: BRETON, Michel-Andrès

ID de Contribution: **9** Type: **Non spécifié**

Current and future constraints on cosmology and modified gravitational wave friction from binary black holes

mercredi 18 janvier 2023 09:30 (30 minutes)

Orateur: STEER, Danièle (APC, Université Paris Diderot, Paris, France)

ID de Contribution: **10** Type: **Non spécifié**

Gravitational portals in the early Universe

mardi 17 janvier 2023 16:00 (30 minutes)

Orateur: CLERY, Simon (IJCLab - Pôle théorie)

ID de Contribution: **11** Type: **Non spécifié**

Constraints on the Optical Depth to Reionization from Balloon-borne Cosmic Microwave Background Measurements

mercredi 18 janvier 2023 11:30 (30 minutes)

Orateur: ERRARD, Josquin (APC)

ID de Contribution: **12** Type: **Non spécifié**

SIBELIUS-DARK: a galaxy catalogue of the local volume from a constrained realization simulation

mercredi 18 janvier 2023 09:00 (30 minutes)

Orateur: LAVAUX, Guilhem (IAP, CNRS INSU)

ID de Contribution: **13** Type: **Non spécifié**

Massive sterile neutrinos in the early universe: From thermal decoupling to cosmological constraints

mardi 17 janvier 2023 14:30 (30 minutes)

Orateur: SERPICO, Pasquale (LAPTH)

ID de Contribution: **14** Type: **Non spécifié**

DESI first results with Early Data

mercredi 18 janvier 2023 16:40 (30 minutes)

Orateur: ROCHER, Antoine

ID de Contribution: **15** Type: **Non spécifié**

Weak lensing in the UNIONS survey: Analysis with the galaxy shape measurement pipeline ShapePipe and first results.

jeudi 19 janvier 2023 09:00 (30 minutes)

Orateur: KILBINGER, Martin

ID de Contribution: **16** Type: **Non spécifié**

Revue sur l'inflation

mardi 17 janvier 2023 11:30 (30 minutes)

Orateur: GRAIN, Julien

ID de Contribution: **17** Type: **Non spécifié**

Cosmological inference from the EFTofLSS

mardi 17 janvier 2023 14:00 (30 minutes)

Orateur: ZHANG, Pierre

ID de Contribution: **18** Type: **Non spécifié**

Constraining spatial curvature with large-scale structure

mercredi 18 janvier 2023 14:00 (30 minutes)

Orateur: LARENA, Julien

ID de Contribution: **19** Type: **Non spécifié**

The status of deuterium in precision Big Bang nucleosythesis.

mardi 17 janvier 2023 16:30 (30 minutes)

Orateur: PITROU, Cyril

ID de Contribution: **20** Type: **Non spécifié**

Status on the H0 tension

mercredi 18 janvier 2023 12:00 (30 minutes)

Orateur: RIGAULT, Mickael (IP2I (CNRS/IN2P3))

ID de Contribution: **21** Type: **Non spécifié**

Neutrino decoupling including flavour oscillations and primordial nucleosynthesis

mercredi 18 janvier 2023 17:30 (30 minutes)

Orateur: VOLPE, Maria Cristina (Astroparticle and Cosmology (APC) Laboratory/CNRS)

ID de Contribution: **22** Type: **Non spécifié**

A Review of The Impact of Deep Learning on the Analysis of Cosmological Galaxy Surveys

mardi 17 janvier 2023 12:00 (30 minutes)

Orateur: LANUSSE, Francois (CNRS)

ID de Contribution: **23** Type: **Non spécifié**

High Magnetic Fields to Probe the sub-eV range of Particle/Astroparticle Physics –From OSQAR experiments up to new projects & perspectives at CERN & CNRS-Grenoble

jeudi 19 janvier 2023 09:50 (30 minutes)

Orateur: PUGNAT, Pierre

ID de Contribution: **24** Type: **Non spécifié**

Flash talks

ID de Contribution: **25** Type: **Non spécifié**

Cosmologie Analogue en Laboratoire

mardi 17 janvier 2023 17:00 (20 minutes)

Après avoir observé la radiation de Hawking ou la super-radiance de Penrose en laboratoire, effectué les premiers voyages interstellaires dans un trou de ver analogue et plonger dans des trous noirs artificiels, la communauté de Gravitation Analogue migre progressivement vers la Cosmologie Analogue. Dans cette présentation, je sensibiliserai la communauté de Cosmologie Physique aux systèmes analogues et aux perspectives de comparaison dans un apport mutuel et enrichissant.

Orateur: ROUSSEAUX, Germain (CNRS)

ID de Contribution: **26** Type: **Non spécifié**

Testing the accuracy of likelihoods for cluster abundance cosmology

mardi 17 janvier 2023 17:20 (20 minutes)

The abundance of galaxy clusters is a sensitive probe to the amplitude of matter density fluctuations, the total amount of matter in the Universe as well as its expansion history. Inferring correct values and accurate uncertainties of cosmological parameters requires accurate knowledge of cluster abundance statistics, encoded in the likelihood function. We present a framework to test the accuracy of cluster abundance likelihoods used in the literature, namely the Poisson and Gaussian likelihoods as well as the more complete description of the Gauss-Poisson Compound likelihood. To do so, we use a suite of 1000 large cosmological simulations of dark matter halo catalogs obtained by the PINOCCHIO algorithm, and we evaluate the accuracy of a given likelihood by comparing individual posterior covariances to the covariance of estimators over the 1000 dark matter halo catalogs, for a variety of binning choices and analysis setups.

Orateur: PAYERNE, Constantin (LPSC-IN2P3)

ID de Contribution: **27** Type: **Non spécifié**

Title: Constraining constant and tomographic coupled dark energy with low- and high-redshift probes

We consider coupled dark energy (CDE) cosmologies, where dark matter particles feel a force stronger than gravity, due to the fifth force mediated by a scalar field which plays the role of dark energy. We perform for the first time a tomographic analysis of coupled dark energy, where the coupling strength is parametrised and constrained in different redshift bins. This allows us to verify which data can better constrain the strength of the coupling and how large the coupling can be at different epochs. First, we employ cosmic microwave background data from Planck, the Atacama Cosmology Telescope (ACT) and the South Pole Telescope (SPT), showing the impact of different choices that can be done in combining these datasets. Then, we use a range of low redshift probes to test CDE cosmologies, both for a constant and for a tomographic coupling. In particular, we use for the first time data from weak lensing (the KiDS-1000 survey), galaxy clustering (BOSS survey), and their combination, including 3x2pt galaxy-galaxy lensing cross-correlation data. We see that with a tomographic CDE model, there can be a considerable degree of variation in coupling strength between different epochs. When combining CMB and low redshift probes other than weak lensing and galaxy clustering, we see that coupling at redshifts $z \lesssim 5$ is considerably unconstrained. On the other hand, galaxy clustering and consequently 3x2pt are able to place tight constraints on the coupling strength β, with $\beta \boxtimes 0.02$ at 68% C.L. for a constant coupling case, making upcoming galaxy surveys potentially powerful probes to constrain such CDE models.

Orateur: GOH, Lisa (CEA/Irfu/DAp/LCS)

Classification de Session: Flash Talks

ID de Contribution: **28** Type: **Non spécifié**

Dark energy and string theory

mardi 17 janvier 2023 17:40 (20 minutes)

"The question of dark energy has been revived in the recent years in string phenomenology, in part due to so-called swampland conjectures. Getting well-controlled string effective theories with de Sitter spacetimes is very challenging, asking the question of alternatives to reproduce observed cosmology (quintessence, multifield inflation, or else).

Orateur: ANDRIOT, David (LAPTh, CNRS)

ID de Contribution: **29** Type: **Non spécifié**

Constraintes on dark-matter with galaxies and MUSE

mercredi 18 janvier 2023 16:20 (20 minutes)

“un certain nombres de resultats pertinent sur la matière noire ont été recemment obtenu avec MUSE tel que Regis et al 2021 sur les axions, Zoutendijk et al. 2021 sur les profiles dans les naines, et Bouché et al. 2022 sur les galaxies distantes depuis la cinématique des galaxies. Je propose de presenter une revue rapide de ces résultats et les perspectives dans ce domaine.
“

Orateur: BOUCHE, Nicolas (CRAL)

ID de Contribution: **30** Type: **Non spécifié**

Accurate galaxy cluster cosmology with the NIKA2 Sunyaev-Zeldovich Large Program

mercredi 18 janvier 2023 15:40 (20 minutes)

“Current cosmological studies based on clusters of galaxies are limited by the accuracy with which the mass and the universal properties of these objects can be inferred. The Sunyaev-Zeldovich (SZ) effect is a direct probe of the thermal pressure in the intra-cluster medium. Resolved mapping of the SZ effect towards galaxy clusters is thus the best way to measure their mean radial pressure profile. Moreover, in combination with X-ray data, the mass of the cluster can be measured from high-resolution SZ observations under the hydrostatic equilibrium hypothesis. The NIKA2 camera operating at the IRAM 30-m telescope observes at 150 and 260 GHz with an angular resolution of a few tenths of arcsecondes. As part of the NIKA2 guaranteed-time, the SZ Large Program is devoted to the high-angular resolution SZ mapping of a representative sample of 45 galaxy clusters drawn from the SZ-selected catalogues of the Planck satellite and of the Atacama Cosmology Telescope, and also observed in X-ray with XMM-Newton or Chandra. The main goal of this program is to provide the community with unprecendenteed measurements of the mean pressure profile of galaxy clusters and of the scaling law between the SZ observable and the hydrostatic mass, extending previous measurements to higher redshifts and lower masses, in order to improve the accuracy of cosmological constraints with galaxy clusters. I will review the status of the SZ Large Program, discuss recent results and future implication for cosmology. “

Orateur: PEROTTO, Laurence (LPSC)

ID de Contribution: **31** Type: **Non spécifié**

Constraining cosmological models with the effective field theory of large-scale structures

mercredi 18 janvier 2023 17:10 (20 minutes)

In this talk, I will present the paradigm of the effective field theory of large-scale structures (EFTofLSS) and how it can be used to constrain cosmological models. First I will discuss the consistency of this theory and its predictive power within the LCDM model, and then I will present the constraints of the EFTofLSS applied to BOSS and eBOSS data on some alternative cosmological models.

Orateur: SIMON, Théo (Montpellier Universe and Particles Laboratory - CNRS)

ID de Contribution: **32** Type: **Non spécifié**

Fast and accurate halo model computation with class_sz

mercredi 18 janvier 2023 14:30 (5 minutes)

Class_sz (Bolliet et al) is a code built on Class (Lesgourgues et al) which enables to compute nearly all cosmological power spectra relevant to upcoming CMB and LSS surveys (tsz and ksz, lensing, galaxies, CIB), including cross-correlations and cluster counts for SZ surveys. It is being used in the developpement of pipelines within the Atacama Cosmology Telescope and Simons Observatory. I propose to present the overall architecture of the codes and show different computation, as well as presenting how to interface it with cosmopower (Spurio-Mancini et al) for machine learning emulation. This would be a talk for the Tools and Methodology Working Group.

Orateur: BOLLIET, Boris (Cambridge University)

ID de Contribution: **33** Type: **Non spécifié**

Constraining constant and tomographic coupled dark energy with low- and high-redshift probes

mercredi 18 janvier 2023 14:35 (5 minutes)

We consider coupled dark energy (CDE) cosmologies, where dark matter particles feel a force stronger than gravity, due to the fifth force mediated by a scalar field which plays the role of dark energy. We perform for the first time a tomographic analysis of coupled dark energy, where the coupling strength is parametrised and constrained in different redshift bins. This allows us to verify which data can better constrain the strength of the coupling and how large the coupling can be at different epochs. First, we employ cosmic microwave background data from Planck, the Atacama Cosmology Telescope (ACT) and the South Pole Telescope (SPT), showing the impact of different choices that can be done in combining these datasets. Then, we use a range of low redshift probes to test CDE cosmologies, both for a constant and for a tomographic coupling. In particular, we use for the first time data from weak lensing (the KiDS-1000 survey), galaxy clustering (BOSS survey), and their combination, including 3x2pt galaxy-galaxy lensing cross-correlation data. We see that with a tomographic CDE model, there can be a considerable degree of variation in coupling strength between different epochs. When combining CMB and low redshift probes other than weak lensing and galaxy clustering, we see that coupling at redshifts $z \lesssim 5$ is considerably unconstrained. On the other hand, galaxy clustering and consequently 3x2pt are able to place tight constraints on the coupling strength β, with $\beta \lesssim 0.02$ at 68% C.L. for a constant coupling case, making upcoming galaxy surveys potentially powerful probes to constrain such CDE models.

Orateur: GOH, Lisa (CEA/Irfu/DAp/LCS)

ID de Contribution: **34** Type: **Non spécifié**

Constraining the mass and redshift evolution of the hydrostatic mass bias using the gas mass fraction in galaxy clusters

jeudi 19 janvier 2023 11:30 (20 minutes)

"The gas mass fraction in galaxy clusters is a convenient probe to use in cosmological studies, as it can help derive constraints on a collection of cosmological parameters. It is however subject to various effects from the baryonic physics inside galaxy clusters, which may bias the obtained cosmological constraints. Among different aspects of the baryonic physics, in this presentation I focus on the impact of the hydrostatic equilibrium assumption. I analyse the hydrostatic mass bias B, constraining a possible mass and redshift evolution of this quantity and its impact on the cosmological constraints. To that end I consider cluster observations of the Planck-ESZ sample and evaluate the gas mass fraction using X-ray counterpart observations. I show a degeneracy between the redshift dependence of the bias and cosmological parameters. In particular I find a 3.8σ evidence for a redshift dependence of the bias when assuming a Planck prior on Ωm. On the other hand, assuming a constant mass bias would lead to the extreme large value of Ωm > 0.860. I however show that these results are entirely dependent on the cluster sample I consider. In particular, the mass and redshift trends that I find for the lowest mass-redshift and highest mass-redshift clusters of our sample are not compatible. Nevertheless, in all the analyses I find a value for the amplitude of the bias that is consistent with B ~ 0.8, as expected from hydrodynamical simulations and local measurements, but still in tension with the low value of B ~ 0.6 derived from the combination of cosmic microwave background primary anisotropies with cluster number counts."

Orateur: WICKER, Raphaël (Institut d'Astropysique Spatiale)

ID de Contribution: **35** Type: **Non spécifié**

The Universe (not quite) as a Quantum Lab

mercredi 18 janvier 2023 14:40 (5 minutes)

Abstract: One of the most striking predictions of the standard model of cosmology is to trace back the origin of all the structures of our universe to quantum fluctuations. If we want to access the full implications of this statement, we need to evaluate the quantum information properties of inflationary models. In this talk, I will present the Cosmological Open Quantum System program and exhibit situations where the dynamics of cosmological inhomogeneities evade what was known so far in the lab.

Orateur: COLAS, Thomas (Université Paris Saclay)

ID de Contribution: **36** Type: **Non spécifié**

An emulator for the non-linear matter power spectrum in f(R)CDM cosmology.

mercredi 18 janvier 2023 14:45 (5 minutes)

In order to probe modifications of gravity at cosmological scales one needs accurate theoretical predictions. N-body simulations are required to explore the non-linear regime of structure formation but they are, however, very time consuming. In this work we build an emulator that performs an accurate and fast interpolation between the predictions of a given set of cosmological simulations in f(R) modified gravity. We sample a wide 3D parameter space given by the scalar field value 1e-7 < fR0 < 1e-4, matter density 0.24 < Omega_m < 0.39 and primordial power spectrum normalisation 0.6 < sigma_8 < 1.0 with 110 points distributed in a Latin Hypercube. For each model we perform pairs of f(R)CDM and LCDM simulations covering an effective volume of (560 Mpc/h)ˆ3 with a mass resolution of around 2e10 Msun/h. We compute the matter power spectrum boost due to f(R) gravity B(k)=P_f(R)(k)/P_LCDM(k) and build an emulator using a Gaussian Process. The boost depends only on three cosmological parameters and is much more robust against statistical and systematic errors than the raw power spectrum thus strongly reducing our computational needs. The resulting emulator has an accuracy of 3% across the whole parameter space for scales 0.03 h/Mpc < k < 10 h/Mpc and redshifts 0 < z < 2. Such an emulator could be used to probe f(R) gravity with weak lensing analysis.

Orateur: SAEZ CASARES, Iñigo (LUTH/Université Paris Cité/Observatoire de Paris)

ID de Contribution: **37** Type: **Non spécifié**

MSSM-inflation model revisited

mercredi 18 janvier 2023 16:00 (20 minutes)

"In this talk, I will show how the minimal supersymmetric model (MSSM) naturally embeds single field inflaton candidates. MSSM is an attractive theory as it also provides a Higgs with a mass as measured at CERN and a candidate for dark matter, whose predicted relic density can be compatible with the Planck measurement. I will therefore focus on three questions:
- how to build such an inflation model taking into account radiative corrections,
- what is implied for its parameter space if one requires that it is compatible both with high energy physics and cosmological observations, and how the reheating duration and the runnings of the parameters through the renormalisation group equations impact the results,
- what are its implications for cosmology beyond As and ns."

Orateur: WEYMANN-DESPRES, Gilles

ID de Contribution: **38** Type: **Non spécifié**

Constraining cosmology with the summer fields of the South Pole Telescope

mercredi 18 janvier 2023 14:50 (5 minutes)

The South Pole Telescope (SPT) is a 10-meters diameter telescope observing the Cosmic Microwave Background (CMB) from the South Pole, with angular resolution of arcminutes. A third generation camera (SPT-3G) was mounted on SPT in 2018, showing the remarkable performances of this experiment, which is currently one of the most competitive for CMB science. During the first observing season SPT-3G observed its baseline sky patch (1500 deg2) and obtained cosmological constraints consistent with those of the Planck mission. Deeper observations of the baseline field are currently ongoing, with the goal of achieving cosmological constraints at a level of precision comparable with Planck. In this talk I will present the ongoing analysis of an extension of the SPT-3G survey, which is a combination of the baseline SPT-3G field with the so-called "summer fields", which are additional 3000 deg2 that are observed during the Antarctic summer season. The SPT-3G summer data, combined with the SPT-3G baseline field and Planck data, are expected to provide even tighter cosmological constraints. I will present some preliminary results on the analysis of the SPT-3G summer fields, and forecasts on the constraints of cosmological parameters.

Orateur: GUIDI, Federica (IAP)

ID de Contribution: **39** Type: **Non spécifié**

LSST Observing Strategy: status and impact on cosmology with SNe Ia

jeudi 19 janvier 2023 09:30 (20 minutes)

This talk will provide an overview of the status and plan of the LSST Observing Strategy. A particular emphasis will be placed on the impact of the LSST survey on cosmology with Type Ia Supernovae (SNe Ia). It will be shown that having a deep survey is critical to measure cosmological parameters with high accuracy.

Orateur: GRIS, Philippe (LPC Clermont-Ferrand - IN2P3/CNRS)

ID de Contribution: **40** Type: **Non spécifié**

ΛCDM is alive and well

jeudi 19 janvier 2023 10:50 (20 minutes)

"The concordance model in cosmology, ΛCDM, performs extremely well in accounting for most current cosmological observations with high accuracy.
However, the model faces several tensions with recent cosmological data and their increased accuracy. The discrepancy between the values of the Hubble constant H0 obtained from direct distance scale measurements and the cosmic microwave background (CMB) is the most statistically significant, but the amplitude of the matter fluctuations is also considered a serious concern.
I will review the current situation. First, I will show that the combination of several recent measurements from local probes leads to a tight constraint on the current matter density ΩM as well as on the amplitude of matter fluctuations, both in good agreement with the values deduced from the CMB. Secondly, I will treat the Hubble tension by assuming that some determinations of the value of H0 are possibly biased and statistically compare these ""ΛCDM+ H0 bias"" models to alternative cosmological models. I find that the former can statistically outperform the extended models proposed so far.
Finally, I illustrate that the recent Pantheon+ results combined with the inferred SH0ES value lead to a value of the reduced cosmological density parameter, ⌧⌧ that conflicts with the inferred CMB value for the LCDM model. The situation does not really improve with the alternative models twisted to resolve the Hubble tension."

Auteur principal: BLANCHARD, Alain (IRAP)

Co-auteur: BLANCHARD, Alain (IRAP)

Orateurs: BLANCHARD, Alain (IRAP); BLANCHARD, Alain (IRAP)

ID de Contribution: **41** Type: **Non spécifié**

Primordial non-Gaussianity in the non-linear matter and halo fields

mercredi 18 janvier 2023 14:55 (5 minutes)

"Future Large Scale Structure surveys are expected to improve over current bounds on primordial non-Gaussianity (PNG), with a significant impact on our understanding of early Universe physics. However, the level of such improvements strongly depends on the extent to which late time non-linearities erase the PNG signal on small scales.
In this talk, I will present our results based on the Quijote-PNG set of N-body simulations and halo catalogues. I will discuss how much primordial information remains in the bispectrum of the non-linear matter density field, and how combining it with the matter power spectrum helps to break degeneracies with standard ΛCDM parameters. I will also comment the case of the halo field, for which we developed a simple procedure for the joint estimation of cosmological and PNG parameters using optimal data compression."

Orateur: JUNG, Gabriel (IAS (Orsay))

ID de Contribution: **42** Type: **Non spécifié**

Quantum features of inflationary perturbations

jeudi 19 janvier 2023 11:10 (20 minutes)

The statistical properties of the CMB anisotropies, reflecting the curvature inhomogeneities in the very early Universe, are very well accounted for by assuming that the inhomogeneities come from amplified vacuum fluctuations; they have a quantum origin.
I will review the long-standing discussions on the possibility of proving this origin and the current nature, classical or quantum,
of the perturbations, with particular emphasises on the latest quantum information approaches.

Orateur: MICHELI, Amaury (IJCLab)

ID de Contribution: **43** Type: **Non spécifié**

CMB cosmological constraints from the Temperature and Polarization data of the SPT-3G 2018 survey

jeudi 19 janvier 2023 12:10 (30 minutes)

First results for the 2018, 4 months survey, of the SPT-3G camera were presented initially using only the EE and TE spectra of the data.
We updated very recently this result adding the TT power spectrum, allowing to improve the previous constraints by around 15%.
I will discuss those new results and their comparison to past and current CMB surveys.

Orateur: BENABED, karim

ID de Contribution: **44** Type: **Non spécifié**

Coherent analysis of CMB primary and secondary anisotropies

jeudi 19 janvier 2023 11:50 (20 minutes)

The Cosmic Microwave data at very small scales are known to probe not only primordial CMB fluctuations but also many extragalactic components such as tSZ, kSZ, CIB, points sources.

I will show how to use the cosmological dependent SZ signatures (tSZ and kSZ) at small scales coherently with the large scales and the cosmology framework in Planck and SPT experiments to retrieve both cosmological parameters and reionisation history. Using machine learning to compute efficiently the SZ angular power spectra, I will show new constraints obtained using SPT CMB observations combined with the latest Planck observed tSZ spectrum. I will discuss how such a coherent analysis could bring additional cosmological information and shed light on the sigma8 tension observed between CMB and clusters.

Orateur: DOUSPIS, Marian (IAS (Orsay))

ID de Contribution: **45** Type: **Non spécifié**

Spectral-Imaging with QUBIC : a new window to galactic foregrounds

mercredi 18 janvier 2023 15:00 (5 minutes)

M. Regnier1, E. Manzan2,3, S. Paradiso2,3, L. Zapelli2 on behalf of
the QUBIC collaboration
1 Universit´e de Paris, CNRS, Astroparticule et Cosmologie, F-75006 Paris, France
2 Universit'a degli studi di Milano, Milano, Italy
3 INFN sezione di Milano, 20133 Milano, Italy

The Q&U Bolometric Interferometer for Cosmology (QUBIC) is the first bolometric interferometer that aims at measuring the primordial B-mode polarization of the CMB. A Technological Demonstrator working in the 150 GHz channel will observe the sky from Alto Chorillo, Argentina, starting from the end of 2022. Subsequently, the full instrument will be operational and observe in two frequency bands, centered at 150 GHz and 220 GHz.
Bolometric interferometry is a novel technique that combines the sensitivity from bolometric detectors with the control of instrumental systematic effects from interferometry. Furthermore, a unique feature of bolometric interferometry is spectral imaging: the ability to recover the sky signal in several sub-bands within the physical band, providing a spectral resolution unattainable for a traditional imager ($\Delta\nu/\nu \sim 0.04$).
In this study we investigate how the increased spectral resolution provided by Bolometric Interferometry can resolve Galactic foreground complexity and provide robustness to foreground mitigation for primordial B-mode studies. For this purpose, we addressed the component separation procedure for two different experimental configurations. The first one consists of the anticipated CMB-S4 sensitivities and frequency coverage; for the second one, we extended the CMB-S4 set up with QUBIC spectral resolution (corresponding to a bolometric interferometry version of the same experiment).
Our results indicates that unaccounted dust frequency decorrelations lead to a biased result of the order of r ⊠ 10−3. However, when changing the spectral resolution, the bias also changes thus hinting that the estimated r is not due to primordial CMB B-modes.

Orateur: RÉGNIER, Mathias

ID de Contribution: **46** Type: **Non spécifié**

Chair: Vincent Vennin