Libro de resúmenes

Miércoles 5 de noviembre (Auditorio FACE)

[1] **Jorge Luis Alfaro Solís (Pontificia Univ Católica de Chile)**

Very Special Relativity Models:Infrared regularization and loop corrections

We review the $Sim(2)$ invariant infrared regularization of Very Special Relativity models that we have proposed recently and apply it to compute loop corrections in Quantum Electrodynamics with VSR masses for neutrino and photon. Measurable physical predictions are obtained. Finally, we review our recent work on the quantization of gauge theories in algebraic non-covariant gauges that simplify calculations in gauge theories and open new avenues for applications in non-local models.

[2] **Diana Laura López Nacie (Univ de Buenos Aires)**

Probing Ultra-Light Dark Matter models with pulsars and gravitational wave interferometers

I will consider some examples of Dark Matter (DM) models where the DM can be described by classical (scalar, vector or tensor) waves. I will present the basic phenomenology and some particular estimates to illustrate that both data from pulsar timing and gravitational wave interferometers are useful to probe ultra-light DM models.

[3] **Carlos M. Reyes (Univ del Bío-Bío)**

Modified gravity theories with spacetime symmetry breaking

En la charla revisamos dos tipos de rompimiento de simetrías de espaciotiempo en gravedad. Estos son rompimientos explícitos, como los que ocurren en gravedad masiva o Horava-Lifshitz, y rompimiento explicito como los que ocurren en bumblebee-gravity. Mostramos un nuevo método que permite usar y generalizar estas teorías a espaciotiempo que poseen vectores de Killing como en cosmología y mostramos algunas aplicaciones.

[4] **Paulo Andrés Areyuna Calabrese (Pontificia Univ Católica de Chile)**

Testing Super-WIMPs and the Reheating Temperature at Collider Experiments

We propose a Standard Model extension with two singlet particles, both stabilized by a new Z_2 symmetry and acting as dark matter candidates. One singlet is feebly interacting while the other thermalizes with the early Universe plasma. We identify the viable parameter space for this mixed production scenario and assess its discovery potential at collider experiments, focusing on the reach of far-detector facilities.

[5] **Markos Maniatis (Univ del Bío-Bío)**

Fisica con mas de un bosón de Higgs

En el Modelo Estándar contamos con un único bosón de Higgs, responsable de generar masa a las partículas elementales. En esta charla exploraremos extensiones con más de un doblete de Higgs — en particular, el modelo de dos dobletes (2HDM) — para abordar limitaciones del paradigma actual, desde nuevas fuentes de violación de CP hasta posibles respuestas a problemas abiertos.

[6] **Cristian Villavicencio (Univ del Bío-Bío)**

Influence of Extreme Magnetic Fields on the Quark Anomalous Magnetic Moment

We calculate one-loop QCD corrections to the photon–quark–antiquark vertex in the presence of an external uniform magnetic field, working in the lowest Landau level approximation. Owing to the field's intensity, the anomalous magnetic moment

(AMM) exhibits polarization-projection–dependent behavior. Under such extreme conditions, the AMM contribution to the magnetic part of the photon is entirely suppressed, surviving only in the electric part. We further analyze the AMM using various infrared regularization schemes and investigate its dependence on different strong-coupling scales. The results are equally applicable to the electron AMM.

[7] **Tomas Esteban Ferreira Chase (Univ de Buenos Aires)**

Cosmological perturbations with ultralight dark matter: spin 0 and 1

I will review models in which dark matter is described by an ultralight field. In particular, I will focus on the cosmological perturbations of spin-0 and spin-1 candidates. I will highlight the main differences in their predictions, and discuss the possibility for distinguishing the spin of dark matter using data from the matter power spectrum.

[8] **Evelyn Rodríguez Durán (Univ Católica de la Santísima Concepción)**

Maxwell gravity in 3D: Thermodynamics of cosmological solutions and black holes with torsion

In this work, we investigate the thermodynamic properties of the solutions of three-dimensional Maxwell Chern-Simons gravity, both with and without torsion. In the torsionless case, we construct and analyze the entropy of asymptotically flat cosmological solutions, showing that the gravitational Maxwell field introduces a new global charge which modifies the first law of thermodynamics. We then extend the theory by incorporating torsion through a deformation of the Maxwell algebra, leading to a richer geometric structure and a modified asymptotic symmetry algebra. Within this framework, we construct a novel black hole solution that generalizes the BTZ-like black hole with torsion. We compute its conserved charges and entropy, establishing a consistent thermodynamic description. Our results highlight how the presence of torsion and the gravitational Maxwell field enrich the structure of three-dimensional gravity and open new directions in the study of non-Riemannian geometries with non-trivial asymptotics.

[9] **Francisco Tello Ortiz (Univ de La Frontera)**

On the wave zone in f(R) gravity

As in the General Relativity theory, it is shown that f(R) gravity theories have a well defined wave zone where the additional degrees of freedom do not destroy the free propagation of gravitational waves beyond this zone.

[10] **Patrick Keissy Concha Aguilera (Univ Católica de la Santísima Concepción)**

Non-Lorentzian Gravity and Torsion

In this talk, we explore the non-Lorentzian regime of the Mielke-Baekler (MB) gravity model within the Chern–Simons formalism. The MB approach naturally incorporates non-vanishing torsion into three-dimensional gravity. Here, we analyze both the Galilean and Carrollian limits of the MB theory, and show that, in this framework, the cosmological constant can be interpreted as a source of torsion in a non-Lorentzian setting.

[11] **Pedro Alvarez (Univ San Sebastian / CECs)**

Unifying gravity and gauge bosons with supersymmetry in the adjoint representation

We use Clifford realizations of superalgebras for constructing models that incorporate gravity, gauge fields, and matter fields within the adjoint representation of the super algebra. A distinctive feature of our approach is that matter fields are integrated directly into the gauge connection, and matching the degrees of freedom between fermions and bosons is not required. We will discuss the general properties of the theory, highlight interesting gravitational solutions it admits, and explore potential physical applications—particularly in the context of building grand unified models and models for dark energy.

[12] **Adolfo Rene Cisterna Roa (Charles Univ / Univ de Tarapacá)**

A new exact rotating spacetime in vacuum: The Kerr–Levi-Civita Spacetime

We construct a new rotating solution of Einstein's theory in vacuum by exploiting the Lie point symmetries of the field equations in the complex potential formalism of Ernst. In particular, we perform a discrete symmetry transformation, known as inversion, of the gravitational potential associated with the Kerr metric. The resulting metric describes a rotating generalization of the Schwarzschild–Levi-Civita spacetime, and we refer to it as the Kerr–Levi-Civita metric. We study the key geometric features of this novel spacetime, which turns out to be free of curvature singularities, topological defects, and closed timelike curves. These attractive properties are also common to the extremal black hole and the super-spinning case. The solution is algebraically general (Petrovtype I), and its horizon structure is exactly that of the Kerr spacetime. The ergoregions, however, are strongly influenced by the Levi-Civita-like asymptotic structure, producing an effect akin to the magnetized Kerr–Newman and swirling solutions. Interestingly, while its static counterpart permits a Kerr–Schild representation, the Kerr–Levi-Civita metric does not admit such a formulation.

[13] **Keanu Kevin Müller Astete (Univ de Concepción)**

Mixing "Magnetic" and "Electric" Ehlers–Harrison transformations: The Electromagnetic Swirling Spacetime and Novel Type I Backgrounds

In this paper, we obtain a complete list of stationary and axisymmetric spacetimes, generated from a Minkowski spacetime using the Ernst technique. We do so by operating on the associated seed potentials with a composition of Ehlers and Harrison transformations. In particular, assigning an additional "electric" or "magnetic" tag to the transformations, we investigate the new spacetimes obtained either via a composition of magnetic Ehlers and Harrison transformations (first part) or via a magnetic-electric combination (second part). In the first part, the resulting type D spacetime, dubbed electromagnetic swirling universe, features key properties, separately found in swirling and (Bonnor–)Melvin spacetimes, the latter recovered in appropriate limits. A detailed analysis of the geometry is included, and subtle issues are addressed. A detailed proof that the spacetime belongs to the Kundt family, is included, and a notable relation to the planar-Reissner-Nordström-NUT black hole is also meticulously worked out. This relation is further exploited to reverse-engineer the form of the solution in the presence of a nontrivial cosmological constant. A Schwarzschild black hole embedded into the new background is also discussed. In the second part, we present four novel stationary and axisymmetric asymptotically nonflat type I spacetimes, which are naively expected to be extensions of the Melvin or swirling solution including a NUT parameter or electromagnetic charges. We actually find that they are, under conditions, free of curvature and topological singularities, with the physical meaning of the electric transformation parameters in these backgrounds requiring further investigation.

[14] **Cristóbal Ariel Laporte Muñoz (Radboud Univ Nijmegen)**

On the stability of black hole event horizons in higher-derivative theories of gravity

A universal prediction of quantum gravity is that the dynamics of general relativity are modified by interactions involving higher-order spacetime curvature. In this talk, I will present an analytic mechanism to evaluate the stability of the would-be event horizon in general relativity supplemented by higher-curvature terms. I will illustrate this mechanism through analytic and numerical results from several well-known theories, and hypothesize under which conditions the event horizon is removed, resulting in either a naked singularity or a wormhole.

Jueves 6 de noviembre (Auditorio FACE)

[15] **Nelson Videla Menares (Pontificia Univ Católica de Valparaíso)**

Cosmic slowing down of acceleration with the Chaplygin-Jacobi gas as a dark fluid?

A particular generalization of the Chaplygin inflationary model, using the formalism of Hamilton-Jacobi and elliptic functions, results in a more general non-linear Chaplygin-type equation of state (Chaplygin-Jacobi model). We investigate the implementation of this model as a dark energy (DE) fluid to explain the recent acceleration of the universe. Unlike ΛCDM and other Chaplygin-like fluids, where the final fate of the universe is an eternal de Sitter (dS) phase, the dynamics of this model allows for the possibility of a decelerating phase in the future, following the current accelerating phase. In other words, a transient acceleration arises, accounting for the recently claimed slowing down phenomenon. This Chaplygin-Jacobi model shows important differences compared to the standard and generalized Chaplygin gas models. Additionally, we perform a Markov Chain Monte Carlo (MCMC) analysis using several datasets, including Type Ia Supernovae (SNIa), Cosmic Chronometers (CC), Fast Radio Bursts (FRBs), and Baryon Acoustic Oscillations (BAO) to examine the observational viability of the model. Our results indicate that, although a transient phase of accelerated expansion is supported by current observations in the context of the Chaplygin-Jacobi model, this model is strongly disfavored in comparison with ΛCDM.

[16] **Domenico Sapone (Univ de Chile)**

The cosmological basis with Euclid Survey

The Euclid survey will map the large scale structure with the aim of measuring the parameters of the standard cosmological model with unprecedented precision. However, the great sensitivity of Euclid can also be exploited to test the most fundamental assumptions at the basis of the standard cosmological model. Here we present two works of the Euclid Consortium where, forecasts from Euclid together with data from other surveys, are used to constrain the assumptions of homogeneity and isotropy of the universe and the growth of large scales structures.

[17] **Carlos Ríos Morales (Univ Católica del Norte)**

From Inflation to Reheating: A Reconstruction of the Early Universe within a Non-Canonical Framework

In this study, we introduce a methodology to reconstruct the inflationary potential and coupling functions in non-canonical inflationary models, using the scalar spectral index as the main input. Focusing on a model with a nonlinear kinetic term $K(X,\phi) = X + g(\phi)X^2$, we derive the effective potential and coupling function within the slow-roll approximation. The analysis is extended to the reheating epoch, allowing us to estimate the reheating temperature and number of e-folds. Finally, the model parameters are constrained using the latest *Planck* and *BICEP/Keck* data.

[18] **Spyros Sypsas (Univ del Bío-Bío)**

Confronting IR divergences in de Sitter QFT

Scalar field theory on de Sitter space suffers from infrared (IR) divergences, highlighting the necessity of nonperturbative methods for IR resummation. A well-known triad of statements encapsulates the IR issue: (1) the massless Bunch–Davies vacuum breaks de Sitter invariance; (2) the coincident limit of the two-point correlator exhibits secular growth; and (3) stochastic inflation provides a nonperturbative resummation framework. I will present an alternative perspective on each of these equivalent statements and discuss possible phenomenological implications.

$\Longrightarrow$ **Sesión de posters**: *ver listado a continuación* $\Longleftarrow$

[19] **Fabiola Arévalo (Univ Mayor)**

Dark Sector Cosmology with Sign-Changeable Interactions

The unknown nature of the dark sector allows us to explore possible cosmological interactions between its components. Should such interactions involve energy transfer in only one direction? Can we obtain constraints on these interactions from a thermodynamic perspective? We review various models from different origins in an attempt to answer these questions.

[20] **Victor Hugo Cárdenas Vera (Univ de Valparaiso)**

Exploring dark energy evolution

Traditional studies of dark energy evolution rely on parametric methods, where a specific functional form (e.g., CPL, polynomials) is assumed. These approaches are simple but inherently restrictive. Non-parametric methods such as Gaussian

Processes or Genetic Algorithms aim to avoid this, yet still depend on choices like kernels or mutation strategies, which introduce hidden biases. In this talk, I present an alternative: a direct inversion method, where the dark energy density X(z) is reconstructed from supernova data by inverting observational relations. The only input is the derivative of the apparent magnitude with respect to redshift, allowing a data-driven estimate with minimal assumptions. Applied to the Pantheon+ compilation, the method reveals a mild increase in X(z) between 0.05¡z¡1, robust under both Planck and SH0ES priors. This direct reconstruction can then guide parametrizations — such as quadratic forms or CPL — not as assumptions, but as interpretations suggested by the data. Takeaway: inversion provides a transparent, bias-minimizing tool to explore dark energy evolution, complementing both parametric and non-parametric approaches.

[21] Alejandro Andrés Saavedra San Martín (Univ Andrés Bello)

Compact objects in 4D Einstein-Gauss-Bonnet gravity

Compact astrophysical objects, such as neutron stars, provide natural laboratories for testing gravity in extreme regimes. A correct theory of gravity should be able to describe current and future gravitational-wave observations of astrophysical objects lying within the mass gap between the heaviest compact stars and the lightest black holes. In this work, we found neutron star and quark star solutions within the framework of 4D Einstein–Gauss–Bonnet (4D EGB) gravity. In order to provide necessary conditions for the existence of such solutions, we analyzed their stability via adiabatic radial oscillations. We found that the change of stability occurs at the maximum mass, as in General Relativity (GR), obtaining stable stars with greater mass compared to GR and near the black hole limit as we increase the coupling constant of the theory 4D EGB gravity. Consequently, the mass gap between neutron stars and black holes with the same radii is reduced. This reduction suggests that some astrophysical objects, within this theoretical framework, could be massive neutron stars or more exotic compact objects instead of black holes.

[22] Eduardo Guendelman (Univ Ben Gurion del Negev)

Dark Energy, Dark Matter, and scale symmetry in dynamical tension string theories and why 4D

In the modified measure formulation string or branes the tension appears as an additional dynamical degree of freedom. Furthermore in the presence of an additional background scalar field that couples to the strings and locally changes the tension, the tension field really dynamical and the theory has an intrinsic target space scale symmetry. When many types of strings probing the same region of space are considered this tension scalar is constrained by the requirement of quantum conformal invariance. For the case of two types of strings probing the same region of space with different dynamically generated tensions, there are two different metrics, associated to the different strings. Each of these metrics have to satisfy vacuum Einstein's equations and the consistency of these two Einstein's equations determine the tension scalar. The universal metric, common to both strings generically does not satisfy Einstein's equation. We review a case where two string dependent metrics considered here are flat space in Minkowski space and Minkowski space after a special conformal transformation and leads to a well defined brane world solution. We review how the model avoid swampland constraints making treatments for Dark energy and inflation more realistic and how strings with a different tension appear as Dark Matter to us. Since the Dark strings and since the visible strings share the space time, including the same compactification, and since the compactification determines the particle content, we argue that the dark strings lead to Dark copies of the standard model. An argument that many copies will lead to 4D effective spacetime as a consequence of a target space scale symmetry restoration.

[23] Marco Stefano Bianchi (Univ San Sebastián)

Framing a string with a B-field

Wilson loops are versatile probes of gauge dynamics and play a crucial role in AdS/CFT holography, where they map to open strings in dual geometries. I will survey exact results for supersymmetric Wilson loops with emphasis on Chern–Simons–matter theories and the emergence of certain topological properties in the string description.

[24] Fabrizio Canfora (Univ San Sebastian / CECs)

Partial decidability protocol for the Wang tiling problem from statistical mechanics and chaotic mapping

I describe a partial decidability protocol for the Wang tiling problem (which is the prototype of undecidable problems in combinatorics and statistical physics) by constructing a suitable mapping from tilings of finite squares of different sizes. Such mapping depends on the initial family of Wang tiles (the alphabet) with which one would like to tile the plane. This allows to define effective entropy and temperature associated to the alphabet (together with the corresponding partition function). We identify a subclass of good alphabets by observing that when the entropy and temperature of a given alphabet are well-behaved in the thermodynamical sense then such alphabet can tile the infinite two-dimensional plane. Our proposal is tested successfully with the known available good alphabets (which produce periodic tilings, aperiodic but self-similar tilings as well as tilings which are neither periodic nor self-similar). Our analysis is able to distinguish alphabets with a good thermodynamical behavior from alphabets with bad thermodynamical behavior. The transition from good to undecidable behavior is related to a transition from non-chaotic to chaotic regime in discrete dynamical systems of logistic type

[25] **Joaquín Eduardo Robledo Montenegro (Univ de La Serena)**

Nonlinear Scalarization of Schwarzschild Black Hole in Scalar-Torsion Teleparallel Gravity

We consider a scalar field coupled to the torsion in Teleparallel Gravity with a coupling function that does not allow for a tachyonic instability to occur, and it leads to the formation of new black holes with scalar hair.

⟹ Charla de divulgación (Auditorio Hermann Gamm) ⟸

[26] **Erik Baradit (Univ del Bío-Bío)**

El Planetario Regional del Biobío: una ventana al universo desde la Universidad del Bío-Bío

El Planetario Regional del Biobío, actualmente en construcción en la Universidad del Bío-Bío, será el primero del sur de Chile y uno de los centros de divulgación científica más importantes de la zona. Con una superficie de 1.700 metros cuadrados distribuidos en dos plantas, contará con salas de exposición, auditorios y espacios para talleres, convirtiéndose en un punto de encuentro entre la ciencia, la educación y la comunidad.

Financiado por el Gobierno Regional del Biobío, este proyecto busca acercar el conocimiento del universo a toda la población, fomentando la curiosidad científica y el aprendizaje interactivo. Su moderna tecnología —que combina proyección digital y opto-mecánica en una cúpula de última generación con capacidad para 95 personas— permitirá vivir una experiencia inmersiva y única bajo las estrellas.

Durante esta presentación, exploraremos cómo este nuevo planetario se proyecta como un referente para la divulgación científica y la descentralización del conocimiento en el sur de Chile, invitando a estudiantes, docentes y público general a ser parte de esta nueva ventana al cosmos desde el Biobío.

Viernes 7 de noviembre (Auditorio FACE)

[27] **Marcela de la Paz Lagos Flores (Univ San Sebastián)**

Superconducting multi-vortices and a novel BPS bound in chiral perturbation theory

We derive a novel BPS bound from chiral perturbation theory minimally coupled to electrodynamics at finite isospin chemical potential. At a critical value of the isospin chemical potential, a system of three first-order differential field equations for the gauge field and the hadronic profile can be derived from the requirement to saturate the bound. These BPS configurations represent magnetic multi-vortices with quantized flux supported by a superconducting current. The corresponding topological charge density is related to the magnetic flux density but is screened by the hadronic profile.

[28] **Aldo Vera Serón (Univ Mayor)**

Universal self-gravitating skyrmions

The self-gravitating skyrmion is an exact solution of the Einstein SU(2)-Skyrme model, describing a topological soliton with baryon number B=1 living in a D=4 space-time in presence of a cosmological constant. Here we show that this solution can be generalized for arbitrary values of the flavor number and when higher order correction in the 't Hooft expansion are considered.

[29] **Julio Eduardo Oliva Zapata (Univ de Concepción)**

de Sitter geometric inflation from dynamical singularities

Within the framework of geometric inflation, where the Friedmann equation is modified to incorporate an infinite series of higher curvature corrections, we describe the emergence of a de Sitter inflationary phase near the poles of an arbitrary dynamical function. Our analysis is quite general and does not depend on any specific choice of cosmological dynamics.

[30] **Norman Cruz (Univ de Santiago de Chile)**

Singularidades en gravedad unimodular

Se exploran las consecuencias cosmológicas derivadas de un Ansatz para el término de difusión en el marco de la gravedad unimodular. Este Ansatz es consistente con la producción positiva de entropía. Se muestran las condiciones para obtener singularidades futuras y una caracterización de las mismas.

[31] **Jose Barrientos (Univ de Tarapacá)**

Rotating spacetimes with a free scalar field in four and five dimensions

We construct explicit rotating solutions in Einstein's theory of relativity with a minimally coupled free scalar field rederiving and finding solutions in four or five spacetime dimensions. These spacetimes describe, in particular, the back-reaction of a free scalar field evolving in a Kerr spacetime. Adapting the general integrability result obtained many years ago from Eriş–Gürses to simpler spherical coordinates, we present a method for rederiving the four-dimensional Bogush–Gal'tsov solution. Furthermore, we find the five-dimensional spacetime featuring a free scalar with two distinct angular momenta. In the static limit, these five-dimensional geometries provide higher-dimensional extensions of the Zipoy–Voorhees spacetime.

[32] **Fernando Izaurieta (Univ San Sebastián)**

One Lagrangian to rule them all, One Lagrangian to find them, One Lagrangian to bring them all, and in the darkness bind them

This work presents a unified gauge theory of gravity, Yang-Mills interactions and matter in d=4, all in terms of a unique gauge curvature.

[33] **Enrico Domenico Schiappacasse Cocio (Univ San Sebastián)**

Dark Matter Compact Objects: Where particle physics, cosmology, and astrophysics meet

I will present the first constraints on the fraction of dark matter existing as dark photon solitons by using the absence of predicted radio-frequency signatures following their mergers around supermassive black holes. This method utilizes enhanced merger rates in dense galactic centers and non-observation of such events to constrain the dark matter fraction in solitons and the dark-visible sector coupling strength. These results establish astrophysical transients as powerful probes of dark sectors, opening a window onto the detectability of ultralight vector fields.

[34] **Simón Darío Riquelme Muñoz (Univ San Sebastián)**

Spontaneous Lorentz Symmetry Breaking and Cosmological Gravitational Particle Production

We examine how cosmological breaking of time translations shapes linear dynamics and gravitational particle production within an EFT framework. Using a two-field Proca proxy, we construct the most general quadratic action consistent with residual symmetries, establish stability conditions (absence of ghosts/gradient instabilities), and pinpoint the non-adiabatic mixing channels that source production. We derive analytic control of Bogoliubov coefficients in relevant regimes and identify parametric windows—set by background evolution and operator scales—where production is sizable yet EFT-safe, clarifying when a single-mode effective description remains predictive.

[35] **Grigorios Panotopoulos (Univ de la Frontera Temuco)**

Stellar modeling in light of current astrophysical constraints: radial oscillations of relativistic stars made of anisotropic matter

Within 4D Einstein's GR we study fluid spheres without rotation assuming a vanishing cosmological constant. The interior solution describing hydrostatic equilibrium may be either numerical adopting a certain EoS or analytic assuming certain profiles for the metric potentials. The solutions are found to be realistic and in agreement with recent astronomical data. The spectra and the large frequency separations of the radial oscillations of pulsating stars are computed and discussed in detail.

[36] **Nikolaos Dimakis (Univ de La Frontera)**

Time operator from parametrization invariance and implications for cosmology

In this talk we review the basic symmetries of parameterization invariant systems that describe the motion of particles in curved spacetimes. Motivated by the analogy of such systems to cosmological Lagrangians, we attempt to address the problem of time in quantum cosmology. To this end, we introduce a time operator which is canonically conjugate to the vanishing Hamiltonian. We discuss the resulting "time-energy" uncertainty relation and explore possible interpretations.

[37] **Jordan Alberto Zambrano Faubla (Univ de Chile)**

Oscillatory Features in CMB Temperature Anisotropies

In the framework of Tomographic Non-Gaussianities (Tomographic NG), the relation between a landscape potential during inflation and quantum fields fluctuations orthogonal to the inflation trajectory, can imprint unique signatures into the primordial distribution of curvature perturbations. These evolve into the CMB anisotropies, and subsequently the large scale structure. Following the work presented in [1], where an approach is presented for probing this landscape potential through CMB temperature anisotropies data. This motivated our study of CMB data cumulant moments, denoted as a_n. It is expected that under gaussian perturbations, a_n would be 0, for values of n ¿ 2. Then, we explore the behavior of these quantities, and also how we can obtain information from them, before reaching the limit of numerical uncertainty. We make different tests to discard hypothesis about the data.

[38] **Andrés Ignacio Burton Villalobos (Univ de Tarapacá)**

Classical and quantum cosmology of $f(R)$ gravity's rainbow in Schutz's formalism

We investigate the classical and quantum dynamics of f(R) gravity's rainbow in the presence of a perfect fluid, employing Schutz's formalism to establish a well-defined notion of time. In the classical regime, we derive and solve the equations of motion, obtaining both analytical and numerical solutions. Through canonical quantization, we formulate the Schrödinger–Wheeler–DeWitt (SWD) equation for the quantum model. By solving its eigenfunctions, we construct the wave function of the Universe and obtain analytical solutions in scenarios dominated by stiff matter. Our results highlight the impact of rainbow gravity on quantum evolution, particularly in modifying the structure of the wave function and shaping the transition from the quantum to the classical regime.

[39] **José Ricardo Villanueva Lobos (Univ de Valparaíso)**

Aplicaciones del gas de Chaplygin-Jacobi

Se presentan algunas aplicaciones recientes del gas de Chaplygin-Jacobi: distribuciones estelares, interacción, entre otras.

Sesión de posters

[1] Daniela Bennett Rebolledo (Univ de Chile)

Non-Gaussian Imprints in Scalar-Induced Gravitational Waves

The Scalar-Induced Gravitational Waves (SIGW) arise from the second-order perturbation of the metric in the conformal Newtonian Gauge, taking into account the perturbations of the scalars and tensors and their interactions. The primordial curvature perturbations are generally assumed to be Gaussian in the literature, with small deviations referred to as non-Gaussianities (NG). In the literature, it is common to parametrize the non-Gaussianities in terms of an expansion of the Gaussianities. Motivated by the work [1], we study a more general case of the parametrization of the non-Gaussianities and implications of this in the Power Spectrum of the Gravitational Waves.

[2] Matheo Gumoor Escobar Vergara (Univ Nacional Andrés Bello)

Higgs Triplet Model: Charged Scalars as Long Lived Particles

El Modelo de Triplete de Higgs añade al sector de Higgs dos nuevos campos, un singlete y un triplete, mediante las interacción de estos campos con bosones y fermiones somos capaces de estudiar fenómenos como la generación de masa para neutrinos mediante el mecanismo de Seesaw Type II, o procesos de violación de sabor leptonico. En este trabajo exploramos dos partículas generadas por el modelo, un boson de Higgs cargado eléctricamente y uno doblemente cargado, como partículas de larga vida.

[3] Gustavo Antonio González Jiménez (Univ Austral de Chile)

Reducción de la Complejidad en Sistemas Magnéticos: Una Aproximación por Simulaciones de Monte Carlo al Modelo de Ising

Se desarrolla desde cero una herramienta en Python, basada en métodos de Monte Carlo, que aproxima los resultados del modelo de Ising. El trabajo se organiza en dos enfoques: uno fiel al modelo original con malla regular y otro que considera posiciones aleatorias en lugar de la estructura ordenada.

[4] Gloria Loreto Henriquez Astorga (Univ de Valparaíso)

Modelos teóricos del bosón X17 y la anomalía del Berilio-8

En los últimos años se ha reportado una anomalía de 6,8 σ en transiciones nucleares del ^{8}Be, consistente con la emisión de un bosón vectorial ligero de masa cercana a 17 MeV que decae en un par $e^{+}e^{-}$. Esta señal ha sido interpretada como posible evidencia de una quinta fuerza mediada por un bosón protófobico (con acoplamientos suprimidos a protones). Este trabajo presenta una revisión de los modelos propuestos en primera instancia por Feng et al. (2016, 2017), y otros más recientes en la literatura, analizando sus implicancias teóricas, las restricciones experimentales actuales, así como su potencial para conectar la física nuclear con nuevas interacciones más allá del Modelo Estándar de partículas elementales.

[5] Clemente Nicolás Miranda Estay (Univ de Chile)

Wavefunction of the Universe in Slow-Roll Inflation with a source

Inflationary perturbations are approximately Gaussian and deviations from Gaussianity are usually calculated using in-in perturbation theory. This method, however, fails for unlikely events on the tail of the probability distribution: in this regime non Gaussianities are important and perturbation theory breaks down. We show that this regime is amenable to a semiclassical treatment. In this limit the wavefunction of the Universe can be calculated in saddle-point, that solves the classical equation of motion. We apply these ideas to the Slow-Roll Inflation model with a background source, where the inflaton has a Damped Driven Harmonic Oscillator (DDHO) type equation of motion. and we compute the wavefunction of this system using the Path Integral formalism.

[6] Diego Miguel Navia Rojas (Univ de Tarapacá / Valparaíso / La Serena)

Numerical Insights on USR Dynamics in Higgs Inflation via PYSR Symbolic Regression

Higgs Inflation, in which the non-minimally coupled Standard Model Higgs field drives cosmic inflation, predicts a spectral index (ns) and tensor-to-scalar ratio (r) consistent with Planck observations. At large field values, The extreme flatness of the potential can give rise to an ultra-slow-roll (USR) phase, in which the acceleration term is non-negligible and the field velocity decays rapidly, further suppressing kinetic energy compared to standard slow roll. The USR regime can significantly affect the number of e-folds and the inflationary observables. We numerically solve the full Higgs field equations without slow-roll assumptions and apply PYSR-based symbolic regression to identify deviations due the transition between SR and

USR regimes. Our analysis quantifies USR duration and we investigate how initial conditions with substantial kinetic energy can produce noticeable shifts in the cosmological observables.

[7] **Ximena Paniagua Sánchez (Univ de Chile)**

Fisher matrix forecast for the observable of N-counts

This numerical work uses number counts observable and the Fisher matrix formalism to constrain cosmological parameters and improve the scientific use of the Euclid space telescope.

[8] **Nicolás Parra Vera (Univ de Chile)**

The leading contribution of transient instabilities to cosmic correlators

Cosmological correlators, the statistical averages of primordial fluctuations, offer a window into high-energy physics during inflation. In this talk, I will present a formalism to identify and estimate the leading contribution from inflationary models featuring bursts of particle production.

[9] **Vicente Kabeer Pedreros Aballay (Univ de Chile)**

ML Emulation of the Non-Linear Power Spectrum in Horndeski Gravity as an Effective Dark Energy Fluid

We are building emulators for the non-linear matter power spectrum that incorporates effects of Dark Energy perturbations. To this end, we have fully integrated the Einstein-Boltzmann code mochi_CLASS with the N-body code CONCEPT. This setup enables the generation of nonlinear power spectra for a range of Dark Energy models characterized by a time-dependent equation of state, nontrivial sound speed, and anisotropic stress. This allows for the exploration of the Modified Gravity and Dark Energy correspondence that holds at linear level. Future work includes the inclusion of non-linear contributions to the N-body code, so we can improve constraints on Dark Energy parameters with current and upcoming data from experiments like DES and DESI.

[10] **Gabriela Belén Segura González (Univ de Santiago de Chile)**

Estudio de modelos cosmológicos en el marco de gravedad modificada

En este trabajo, nos centramos en el marco de gravedad unimodular, que corresponde a una modificación de la relatividad general en la que se restringe las transformaciones de coordenadas a aquellas que dejan fijo el determinante de la métrica, de modo que la constante cosmológica surge como una constante de integración y la conservación local de la energía no es estricta. Esto permite introducir funciones de difusión Q(t) que describen violaciones controladas de la ley de conservación, con posibles implicancias para la expansión acelerada del universo. El objetivo es estudiar modelos cosmológicos que respeten criterios termodinámicos, evaluando su dinámica mediante el diagnóstico statefinder, herramienta que usa parámetros adimensionales (r,s), para diferenciar entre modelos de energía oscura a través de derivadas de orden superior del factor de escala. Sin profundizar en la termodinámica, como paso inicial, se verificó el comportamiento evolutivo del modelo ΛCDM bajo esta metodología. Posteriormente, se introdujo la difusión mediante un modelo barotrópico $Q(t) = \alpha\rho$ en un universo dominado exclusivamente por materia. Los resultados preliminares muestran que, a pesar de encontrarse en regímenes de gravedad distintos, ambos modelos convergen en el futuro hacia un atractor tipo de Sitter, reflejando la dominancia de la constante cosmológica. No obstante, sus trayectorias intermedias difieren de manera significativa, lo que permite establecer una clara distinción entre las dinámicas de ambos escenarios.

[11] **Daniel Villalobos Silva (Univ de La Serena)**

Primordial Black Hole Production in f(T,phi)

Currently in physics, one of the main problems is the nature of dark matter. In the past decades, there have been several proposed experiments and observational strategies to directly detect this cosmological component. In gravitation, one of the main candidates that can constitute a fraction of dark matter are primordial black holes (PBHs). These objects have their origin in the radiation epoch from the collapse of energy over-density regions. The production of PBHs in the early universe can leave a characteristic signature in the spectrum of scalar-induced gravitational waves with different features, that could be testable by the upcoming experiments such as LISA. These objects can provide a new window to explore the physics of inflation and phase transitions through gravitational waves. In this research we study the production of PBHs in the context of modified teleparallel gravity models with a fibre inflation potential, motivated by type IIB string theory (Cicoli et al. 2018). In particular, the gravity model includes an additional term, acting as a correction to teleparallel gravity, allowing us to study the inflationary dynamics. The fibre inflation potential presents an inflection point that allow a ultra slow-roll process that leads to an enhancement in the primordial power spectrum up to 10^{-2}. Using the Press-Schechter formalism, we discuss the masses and the fraction of dark matter that PBHs can constitute and their respective observational constraints from future experiments, depending on specific parameter setup for the potential. Additionally, we discuss the compatibility of the inflationary potential with CMB observational data.