RESÚMENES QUINTO ENCUENTRO COSMOCONCE

1. **TBA**
   Pedro Labraña Moraga (Universidad del Bío-Bío)

2. **Generalized Second Law of Thermodynamics for Holographic Dark Energy and cosmological interaction**
   Fabiola Arévalo Reyes (Universidad de La Frontera)

   The thermodynamics of a scheme of dark matter-dark energy interaction is studied considering a holographic model for the dark energy in a flat Friedmann-Lemaitre-Robertson-Walker background. We obtain a total entropy rate for a general horizon and we study the Generalized Second Law of Thermodynamics for a cosmological interaction as a free function. Additionally, we discuss two horizons related to the Ricci and Ricci-like model and its effect on an interacting system.

3. **Cosmic anisotropic doomsday in Bianchi type I?**
   Antonella Cid Muñoz (Universidad del Bío-Bío)

   We study vacuum and non-vacuum scenarios where the anisotropy of space may induce a singularity in the evolution of a cosmological model. Specifically, we study Kasner cosmologies, fully anisotropic Bianchi I with a stiff fluid and ellipsoidal (axisymmetric) cosmological models filled with matter with isotropic and anisotropic barotropic pressure.

4. **Hawking radiation from z=3 and z=1-Lifshitz black holes**
   Samuel Lepe Santa Cruz (Pontificia Universidad Católica de Valparaiso)

   The Hawking radiation considered as a tunneling process is discussed for both z = 3 and z = 1-Lifshitz black holes.

5. **Spherically symmetric Einstein-aether perfect fluid models**
   Genly Leon Torres (Pontificia Universidad Católica de Valparaíso)

   We investigate spherically symmetric cosmological models in Einstein-aether theory with a tilted (non-comoving) perfect fluid source. We use a 1+3 frame formalism and adopt the comoving aether gauge to derive the evolution equations, which form a well-posed system of first order partial differential equations in two variables. We then introduce normalized variables. The formalism is particularly well-suited for numerical computations and the study of the qualitative properties of the models, which are also solutions of Horava gravity. We study the local stability of the equilibrium points of the resulting dynamical system corresponding to physically realistic inhomogeneous cosmological models and astrophysical objects with values for the parameters which are consistent with current constraints. In particular, we consider

dust models in ($\beta-$) normalized variables and derive a reduced (closed) evolution system and we obtain the general evolution equations for the spatially homogeneous Kantowski-Sachs models using appropriate bounded normalized variables. We then analyse these models, with special emphasis on the future asymptotic behaviour for different values of the parameters. Finally, we investigate static models for a mixture of a (necessarily non-tilted) perfect fluid with a barotropic equations of state and a scalar field.

6. **Expansion acelerada en cosmologias AdS con disipación**
Norman Cruz Marín (Universidad de Santiago de Chile)

7. **Warm quartic and warm generalized chaplygin gas inflationary models in light of Planck 2015 results.**
Nelson Videla Menares (Universidad de Chile)

The warm inflation scenario, as opposed to the standard cold inflation, has the attractive feature that it avoids the reheating period at the end of the accelerated expansion. During the evolution of warm inflation, the dissipative effects are important and radiation production takes place at the same time as the expansion of the universe. The dissipative effects arise from a friction term which accounts for the processes of the scalar field dissipating into a thermal bath. In further relation to these dissipative effects, the dissipative coefficient is a fundamental quantity. Additionally, thermal fluctuations during the inflationary scenario may play a fundamental role in producing the primordial fluctuations.

In the present work we study two inflationary models in the warm inflation scenario. Firstly, we show that a warm chaotic inflation characterized by a quartic interaction potential for the inflaton, excluded by current data in standard cold inflation, and by an inflaton decay rate proportional to the temperature, is in agreement with the latest Planck data. The parameters of the model are constrained, and our results show that the model predicts a negligible tensor-to-scalar ratio in the strong dissipative regime, while in the weak dissipative regime the tensor-to-scalar ratio can be large enough to be observed. Secondly, a warm intermediate inflationary model in the context of Generalized Chaplygin Gas is investigated. We study this model in the weak and strong dissipative regimes, considering a generalized form of the dissipative coefficient, and we describe the inflationary dynamics in the slow-roll approximation. We find the constraints on the parameters of our model considering the Planck 2015 data, together with the essential condition for warm inflation to occur, and the conditions for the weak and strong dissipative regimes.

8. **Pure Gauss-Bonnet holographic superconductor**
Olivera Miskovic (Pontificia Universidad Católica de Valparaíso)

We study phase transitions in a thermal quantum field theory holographically dual to Pure Gauss-Bonnet AdS black holes. An order parameter of the superconductor is described by a Stückelberg scalar field. In the probe limit, we find transitions of first and second order and discuss their physical implications

9. **Polymer quantization, stability and higher-order time derivative terms**
Carlos Reyes Martínez (Universidad del Bío-Bío)

The possibility that fundamental discreteness implicit in a quantum gravity theory may act as a natural regulator for ultraviolet singularities arising in quantum field theory has been intensively studied. Here, along the same expectations, we investigate whether a nonstandard representation, called polymer representation can smooth away the large amount of negative energy that afflicts the Hamiltonians of higher-order time derivative theories; rendering the theory unstable when interactions come into play. We focus on the fourth-order Pais-Uhlenbeck model which can be reexpressed as the sum of two decoupled harmonic oscillators one producing positive energy and the other negative energy. As expected, the Schrödinger quantization of such model leads to the stability problem or to negative norm states called ghosts. Within the framework of polymer quantization we show the existence of new regions where the Hamiltonian can be defined well bounded from below.

10. **Pure Lovelock gravity and Chern-Simons theory**
Patrick Concha Aguilera (Universidad Austral de Chile)

We explore the possibility of finding Pure Lovelock gravity as a particular sector of a Chern-Simons action for a specific expansion of the AdS algebra in odd dimensions.

11. **Supergravedad Chern-Simons en 4 dimensiones**
Patricio Salgado Arias (Universidad de Concepción)
Usando técnicas desarrolladas en el contexto de las álgebras diferenciales libres es construída una acción para supergravedad Chern-Simons en 4 dimensiones.

12. **Álgebras de Galileo Generalizadas**
Gustavo Rubio González (Universidad de Concepción)

Mediante el uso del mecanismo de S-expansion de álgebras, se encuentran nuevas simetrías no relativistas. En particular se estudia el límite no relativista de las álgebras de Poincaré generalizadas en el contexto de teorías Chern Simons. Las ecuaciones de movimiento encontradas entregan una modificación a la ecuación de Poisson, la cual podría ser compatible con los efectos de la materia oscura.

13. **N = 1 Supergravity and Maxwell superalgebra**
Evelyn Karina Rodríguez Durán (Universidad Austral de Chile)

We present the construction of the D=4 supergravity action from the minimal Maxwell superalgebra, which can be derived from the osp(4—1) superalgebra by applying the abelian semigroup expansion procedure. We show that N=1, D=4 pure supergravity can be obtained

alternatively as the MacDowell-Mansouri like action built from the curvatures of the Maxwell superalgebra.

14. **Anomalías en la radiación cósmica de fondo a la luz de un modelo de universo emergente**
Carlos Ríos Morales (Universidad del Bío-Bío)

El presente trabajo explora la teoría de los Universos Emergentes como alternativa al Modelo Cosmológico Estándar y al paradigma inflacionario, para intentar explicar algunas de las anomalías detectadas en la Radiación Cósmica de Fondo, como son la pérdida en la amplitud a bajos multipolos del espectro de potencia de la anisotropía en la temperatura y la existencia de una asimetría hemisférica en el cielo.

15. **AIC y BIC en escenarios interactuantes**
Jorge Moya Abuhadba (Universidad de Concepción)

16. **Nueva solución de agujero de gusano con una función de forma lineal**
Luis Liempi Necul (Universidad de Concepción)

Derivamos una solución de agujero de gusano estática y transitable, asumiendo una función de forma con dependencia lineal sobre la coordenada radial. Esta función de forma lineal genera agujeros de gusanos cuyo comportamiento es un espaciotiempo no asintóticamente plano. Estos espaciotiempos son localmente planos en el límite r tendiendo a infinito exhibiendo un déficit o exceso angular sólido. Discutiremos un nuevo agujero de gusano fantasma sin fuerzas de mareas considerando estos defectos angulares. Por último, un estudio del comportamiento de las geodésicas sobre estos espaciotiempos.

17. **Holographic recipe for type-B Weyl anomalies**
Danilo Díaz Vázquez (Universidad Andrés Bello)

We propose a recipe, arguably the simplest, to compute the type-B holographic Weyl anomaly for general higher derivative gravity in asymptotically AdS spacetimes. In 5 and 7 dimensions, we identify a suitable basis of curvature invariants that allows to read off straightforwardly the type-B Weyl anomaly coefficients of the dual CFTs. The virtues of the basis are illustrated with few examples. Finally, we speculate on the possible extension to higher even dimensions.

18. **Holographic trace anomaly of GJMS operators**
Fabrizzio Bugini Jara (Universidad de Concepción)

The trace anomaly of GJMS operators or conformal powers of the Laplacian are computed in four and six dimensions. Although the Type-A anomaly was already known, we obtain the Type-B anomaly for the whole family of GJMS operators. The basis of Weyl invariants where the Euler term is traded by the Q-curvature seems better suited for computational purposes

and also allows for a simple holographic recipe. The holographic findings are confirmed by means of heat kernel techniques combined with the factorization of GJMS on Einstein spaces. The restriction to Einstein metrics on the boundary allows explicit holographic computations that can be contrasted with general predictions in the literature.

19. **Degrees of freedom in modified teleparallel gravity**
María José Guzmán Monsalve (IAFE, CONICET-UBA)

In this work we present the teleparallel framework for general relativity and some modifications of this theories, more known as f(T) gravities. We explore some techniques implemented to find solutions of the equations of motion, such as the null tetrad approach, which has proven its utility in different geometries, like Schwarzschild, Kerr and McVittie spacetimes.

20. **Group invariant transformations in Cosmology**
Andronikos Paliathanasis (Universidad Austral de Chile)

A general method to extract exact cosmological solutions for scalar field dark energy in the presence of perfect fluids is presented. We use as a geometric selection rule the existence of invariant transformations for the Wheeler DeWitt (WdW) equation. We show that the existence of point transformation in which the WdW equation is invariant is equivalent to the existence of Noetherian conservation laws for the field equations. Mathematically, the existence of extra integrals of motion indicates the existence of analytical solutions. We apply that method in scalar field and scalar tensor theories and we show that the method provide us with cosmological models which fit the SNIa+BAO data in a similar way with that of Lambda-cosmology.

Talk based on the papers: PRD 91 (2015) 123535 and PRD 93 (2016) 043528

21. **Cosmologia en delta gravity**
Pablo Emilio González Villarroel (Universidad de Chile)

En este trabajo, es presentado un modelo de gravitación basado en dos tensores simétricos $g_{\mu\nu}$ y $\tilde{g}_{\mu\nu}$ donde además, tenemos una nueva clase de campo de materia dado por $\tilde{\phi}_I = \tilde{\delta}\phi_I$, el cual llamamos $\tilde{\delta}$ matter, donde ϕ_I es el campo de materia original. Este modelo, llamado $\tilde{\delta}$ Gravity, tiene excelentes propiedades a nivel cuántico. Por ejemplo: Solo vive hasta un loop, las ecuaciones de los campo originales son preservadas a nivel cuántico y es una teoría finita en el vacío. Además, encontramos que las partículas masivas no siguen geodésicas, mientras que las no masivas obedecen una geodésica nula de una métrica efectiva. En este trabajo se discutirá brevemente como delta gravity funciona en algunos fenómenos cosmológicos, como por ejemplo: Energía Oscura, Materia Oscura, Agujeros Negros e Inflación. Para esto, se analizarán algunos casos para estudiar el efecto del nuevo campo gravitacional. Primero, veremos la métrica de Schwarzschild, donde obtenemos una modificación a la deflexión de la

luz producida por lente gravitacional. Segundo, estudiaremos la aproximación No-Relativista, donde obtenemos el límite Post-Newtoniano. Y tercero, usaremos la métrica FLRW para explicar la expansión acelerada del universo sin energía oscura. Adicionalmente, introduciremos los efectos de $\tilde{\delta}$ Gravity en Inflación Cósmica.

22. **Modos cuasi-normales escalares en torno a un agujero negro super-entrópico**
Octavio Fierro Mondaca (Universidad Católica de la Santísima Concepción)

En esta charla se presentará el formalismo de Leaver para el cálculo de los modos cuasi-normales de un campo escalar en torno a un agujero negro de Schwarzschild y en torno a un agujero negro de Kerr. Se mostrará en particular la aplicación de este método para el caso del agujero negro super-entrópico, el cual es definido por el límite a-¿l en la solución rotante de AdS.

RESUMEN DIVULGACIÓN

Finalmente, primera detección de ondas gravitacionales!

El 11 de febrero de este año, científicos del Observatorio de Ondas Gravitacionales por Interferometría Laser (LIGO) anunciaron la histórica primera observación por instrumentos terrestres de una onda gravitacional, emitida por un par de agujeros negros en proceso de choque y posterior fusión. En esta charla se discute qué son las ondas gravitacionales predichas por la teoría General de la Relatividad de Einstein, sus propiedades, los esfuerzos que finalmente llevaron a su detección, lo que aprendimos de la fuente que las emite, y las perspectivas futuras de la naciente área de la *astronomía de ondas gravitacionales*.