2024 Flag Meeting - Trento

Report of Contributions

Contribution ID: **1**   Type: **not specified**

Phenomenology of axion inflation

Wednesday, 18 December 2024 14:00 (1 hour)

Presenter: PELOSO, Marco (University of Padua and Istituto Nazionale di Fisica Nucleare)

Contribution ID: **2**   Type: **not specified**

Critical properties of the gravitational Wilson-Fisher fixed point

Wednesday, 18 December 2024 15:00 (30 minutes)

Phase transitions in three dimensions, described by the Wilson-Fisher fixed point, play a pivotal role in condensed matter physics and may also have significant implications
for the physics of the Early Universe. In this context, using the most general theory coupling scalar fields non-minimally to Einstein gravity and exploiting the proper-time functional renormalization group equation, we investigate how Einstein gravity modifies
the Wilson-Fisher fixed point and the dynamics near this fixed point. Specifically, we demonstrate how scaling solutions, their perturbations, and critical exponents are influenced by these effects.

Presenter: Dr GLAVIANO, Emiliano Maria (Istituto Nazionale di Fisica Nucleare)

Contribution ID: **3**   Type: **not specified**

Gravitationally induced decoherence: from theoretical models to signatures in neutrino oscillations

Wednesday, 18 December 2024 15:30 (30 minutes)

The formalism of Open Quantum Systems with linearised gravity as environment serves as a tool to predict the effective evolution of quantised matter systems under the influence of gravity. It is of use to analyse features of specific quantum gravity candidate theories and to search for signs of quantum gravity effects for instance in neutrino oscillations.

In the talk, a model consisting of a scalar matter field and linearised gravity as environment is considered. In order to formulate dynamics and to deal with the gauge freedom present in the environment, the entire system is formulated in terms of relational observables that allow a physical interpretation of temporal and spatial coordinates.

The resulting master equation, which is the effective time evolution equation for the quantised scalar field under the influence of gravity, exhibits UV-divergent terms. To extract the physics of a single scalar particle, the equation is projected onto the one-particle subspace and the individual terms are interpreted as Feynman diagrams. This yields the possibility to perform a QFT renormalisation and the resulting master equation is cast into a completely positive Lindblad form using specific approximations. In the end, the one-particle master equation is applied to study gravitationally induced decoherence in neutrino oscillations.

Presenter: FAHN, Max Joseph (FAU Erlangen-Nürnberg)

Contribution ID: **4**   Type: **not specified**

Physical Running in Conformal Gravity and Higher Derivative Scalars

Wednesday, 18 December 2024 17:00 (30 minutes)

We compute the physical running of a general higher derivative scalar coupled to a nondynamical metric and of higher derivative Weyl-invariant gravity with a dynamical metric in four dimensions. The physical running differs from the μ-running of dimensional regularization due to infrared divergences, unlike in standard two-derivative theories. Using the higher derivative scalar as a toy model, we explore the conformal limit and its relation to the trace anomaly. Despite this difference, higher derivative Weyl gravity remains asymptotically free, suggesting it is a viable completion of Einstein's gravity, at least from the point of view of its renormalization group properties.

Presenter: PARENTE, Luca (Istituto Nazionale di Fisica Nucleare)

Contribution ID: **5**   Type: **not specified**

TBA

Presenter: SANTOS DA COSTA, Simony (Istituto Nazionale di Fisica Nucleare)

Contribution ID: **6**   Type: **not specified**

Evaporating Kerr black holes as probes of new physics

Wednesday, 18 December 2024 16:30 (30 minutes)

In the string axiverse scenario, primordial black holes (PBHs) can sustain non-negligible spin parameters as they evaporate. We show that tracking both the mass and spin evolution of a PBH in its final hour can yield a purely gravitational probe of new physics beyond the TeV scale, allowing one to determine the number of new scalars, fermions, vector bosons, and spin-3/2 particles. Furthermore, we propose a multi-messenger approach to accurately measure the mass and spin of a PBH from its Hawking photon and neutrino primary emission spectra, which is independent of putative interactions between the new degrees of freedom and the Standard Model particles, as well as from the Earth-PBH distance.

Presenter: CALZÀ, Marco (Istituto Nazionale di Fisica Nucleare)

Contribution ID: **7**   Type: **not specified**

Gauge and parametrization dependence of Quantum Einstein Gravity

Thursday, 19 December 2024 09:00 (30 minutes)

Renormalization Group flow in Quantum Einstein Gravity shows gauge and parametrization dependence in quantities such as beta functions and generating functionals.
Using a proper-time regulated flow equation for a Wilsonian effective action, we investigate the properties of the non-Gaussian fixed point in both the Background Field gauge and the Physical gauges, employing linear and exponential parametrizations for the fluctuation.

Presenter: OGLIALORO, Giovanni (Università di Catania)

Contribution ID: **8**   Type: **not specified**

Five brief lessons on the Hubble tension

Thursday, 19 December 2024 09:30 (1 hour)

I will review the Hubble tension and its current status, before discussing five brief recent lessons which can be summarized as follows: 1) pre-recombination new physics alone is not sufficient to solve the tension; 2) constructing a successful model of pre-plus-post-recombination new physics is difficult; 3) Omega_m and omega_c play a key role in the discussion; 4) local structure can make the tension even worse; 5) the overall picture is not significantly changed by the latest DESI data.

Presenter: VAGNOZZI, Sunny (Istituto Nazionale di Fisica Nucleare)

Contribution ID: **9** Type: **not specified**

TBA

Presenter: PEDROTTI, Davide (Unitn)

Contribution ID: **10**	Type: **not specified**

Flag Organization

Thursday, 19 December 2024 12:30 (30 minutes)

Contribution ID: **11** Type: **not specified**

On correlation functions in de Sitter space

Thursday, 19 December 2024 11:00 (30 minutes)

Currently, the study of cosmological correlation functions is extremely favored, and a large number of new techniques are being developed. I will discuss a less fashionable but efficient technique to calculate the loop corrections to a correlation function in the long-wavelength approximation: through the use of the Yang-Feldman-type equation. I will also discuss the obtained results' connection to some stochastic processes and a way to generalize it to the non-perturbative case, as well as further prospects in this direction.

Presenter: PETRIAKOVA, Polina (Istituto Nazionale di Fisica Nucleare)

Contribution ID: **12**   Type: **not specified**

Black hole correspondences: notes and cautionary remarks

Thursday, 19 December 2024 11:30 (30 minutes)

Connections between distinct phenomena often reveal profound insights in physics. In this talk, I will explore the interplay between black hole shadows, quasinormal modes, and greybody factors, highlighting the correspondences that link these seemingly unrelated aspects of black holes. I will delve into the intriguing aspects of these correspondences, by discussing their origin, range of applicability and limitations. Combinations of these correspondences provide new ways of computing the quantities at play; I will discuss the precision of such new methods as compared to the traditional ones and those inspired by machine learning algorithms."

Presenter: PEDROTTI, Davide (Unitn)

Contribution ID: **13**   Type: **not specified**

Non-Newtonian effects of general relativistic disc galaxy models

Thursday, 19 December 2024 12:00 (30 minutes)

Presenter: FONTANA, Matteo (Insubria)