Barcelona Initiative for Gravitation and Cosmology (BIG&C) Meeting

Report of Contributions

https://indico.ifae.es/e/1808

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

Fundamental Physics and Cosmology with the Einstein Telescope

Monday, 22 January 2024 10:30 (60)

Abstract: The observation of gravitational waves by the LIGO/Virgo collaboration has opened a new window
on the Universe. In this decade, however, these experiments will reach the limit of their capabilities,
and a new generation of ground-based detectors is being planned. In Europe, this has led to the proposal of the Einstein Telescope. With order of magnitude improvement in the sensitivity, Einstein
Telescope will explore the depth of the Universe using gravitational waves, and has the potential of
triggering revolutions in astrophysics, cosmology and fundamental physics. We will give a broad overview of its capabilities and scientific targets.

Presenter(s) : MAGGIORE, Michele (Geneva U.)

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

Domain walls as seeds for cosmological phase transitions

Monday, 22 January 2024 14:30 (60)

Abstract: Cosmological phase transitions are interesting phenomena happening in the early Universe, having several phenomenological implications. In this talk I will discuss how the presence of topological defects in the early Universe can modify the mechanism under which the cosmological phase transitions occur, acting as impurities which catalyze the phase transition.
I will focus on the the case of domain walls and how they can affect the electroweak phase transition, employing as an illustrative example the minimal extension of the SM with a scalar singlet odd under a Z_2 symmetry. I will show how to compute the seeded tunneling rate with several techniques, what are the new properties of the seeded phase transitions, and the resulting implications for the gravitational wave spectrum.

Presenter(s) : MARIOTTI, Alberto (VUB Brussels)

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

Towards a Spanish LISA Global Fit Pipeline

Monday, 22 January 2024 16:00 (30)

Abstract: LISA is a large-class mission of the European Space Agency (ESA) to build a space-based gravitational wave observatory. With the mission expected to be formally adopted by the end of this month and an anticipated launch date of 2035, Spain is agreeing to two main contributions to the mission: on the hardware side, the Science Diagnostics Subsystem; on the ground segment, a global fit data analysis pipeline. In this talk, I will be focusing on the latter contribution. I will provide a general overview of the LISA mission, its great scientific potential, and the unique data analysis challenges it faces. From there, I will briefly discuss the currently existing pipeline prototypes, and the computational requirements projected from them. Finally, I will talk about the current and future data analysis efforts in the budding Spanish LISA collaboration led by our research group.

Presenter(s) : VILCHEZ, Ivan (ICE CSIC Barcelona)

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

Active Learning for Gravitational Wave modelling

Monday, 22 January 2024 12:00 (45)

Abstract: As a new era of gravitational wave detections rapidly unfolds, the importance of having accurate models for their signals becomes increasingly important. The best model for GW are the fully-fledged simulations of General Relativity, although their daunting cost makes it prohibitive to perform data analysis. To alleviate this, the community has developed a variety of approximate models, which upon calibration from the detailed simulations are accurate and fast to evaluate. This program requires the exploration of a large and complex parameter space with expensive simulations. We will argue that Active Learning, a data-driven strategy to explore parameter space with costly experiments, is particularly relevant in this scenario, by reducing computational cost, time and human bias.

Presenter(s) : ANDRADE, Tomas (Barcelona U)