Ciclo de Seminarios 2020 B

Fecha: 30 de septiembre
Título: "*Consequences of dissipative dynamics in the early universe*"
Ponente: Dr. Rafael Hernández Jiménez. Departamento de Física, CUCEI.

Resumen

Warm inflation presents an exceptional description of the early universe cosmology. It is a scenario of an inflationary dynamics in which the state of the universe during inflation is not the vacuum state, but rather an excited statistical thermal state. It introduces dissipation into the inflationary dynamics which can be well explained by first principles of a quantum multi-field theory. This approach has several attractive features. For instance, the additional friction may ease the required flatness of the inflaton potential. Besides, even if radiation is subdominant during inflation, may smoothly become the leading component if the ratio of dissipation $Q\gtrsim 1$ at the end of inflation ($\epsilon_{eff}\sim 1+Q$), with no need for a separate reheating period. It also may explain the nature of the classical inhomogeneities observed in the CMB, since for WI the fluctuations of the inflaton are thermally induced; hence there is no need to explain the troublesome quantum-to-classical transition problem of the standard inflation picture, cold inflation, due to the purely quantum origin of the density perturbations. Taking into account above encouraging warm inflation characteristics, in this thesis we will describe both warm inflation model building and the confrontation of theory with observation. We will examine two basic models: The *Warm Little Inflaton* scenario and the **distributed mass** model.

Fecha: 2 de octubre
Título: "Onda Gravitacional de un sistema Agujero Negro-Fragmento"
Ponente: Mario Rafael Torres Quintero. Estudiante de la licenciatura en física del Departamento de Física, CUCEI.

Resumen

En esta presentación analizamos dos cuestiones, la posible detección de Ondas Gravitacionales para el colapso de núcleo de estrellas masivas, pero en este caso no solo como una explosión, sino como un fenómeno capaz de formar un sistema binario dado por un Agujero Negro y un Fragmento. Este último formado en el disco de acreción del Agujero Negro, la creación del fragmento se debe a inestabilidades que conducen a la fragmentación del disco de acreción. Detectar un sistema como este se puede lograr, esto debido a que los sistemas binarios compactos son las únicas fuentes que se han logrado detectar hasta el día

de hoy. Por último también analizamos el Patrón de Antena y su influencia en la detección de las Ondas Gravitacionales por los observatorios. Detectar una de estas ondas ampliará el conocimiento de la astrofísica.

Fecha: 9 de octubre
Título: "Estudio de propiedades topológicas del espacio-tiempo Taub-NUT"
Ponente: Alfonso Zack Robles Saldaña. Estudiante de la Maestría en Física del Departamento de Física, CUCEI.

Resumen

Due to the topological form of this Taub-NUT space-time, there is special interest in its properties and applications, for which we have sought to obtain more properties and characteristics about the topology of the Taub-NUT space-time that help us understand at a basic level this space-time, in addition to improving and continuing with applications and methodologies applicable to more complicated space-times within General Relativity. Through the study of geodetic deviation, using the Newman-Penrose formalism as a mathematical tool, which allows us to understand the way in which geodesics interact in space-time, that is, they allow us to analytically observe how geodesics behave relative to each other. We will seek to find a solution for the coupled differential equation system generated for the geodetic equation and the geodetic deviation equation, to find a function that describes the deviation between them. Matter that has not been treated in this area with a similar formalism. Describing luminous objects with radial geodetic movement it can be found that the deviation suffered by these test objects is a linear function.