



Máster Universitario en
Física: Radiaciones,
Nanotecnología,
Partículas y Astrofísica

Seminarios - curso 2017/2018

En la asignatura Seminario de Invitados (3 ECTS obligatorios) se programa la asistencia de varios profesores invitados de otras universidades tanto nacionales como internacionales. Los invitados y la temática de los cursos impartidos los determina la Comisión Académica del Máster como complemento a la formación de los alumnos del Máster en temas de actualidad.

Seminarios previstos:

III CURSO "Historia de la Física: construyendo futuro"

Ponente: Andrey Zubarev, Ural Federal University (Rusia)

Fecha: 20 de diciembre de 2017

Lugar y hora: aula MS1. 12 horas (1 hora de duración)

Título: Magnetic hyperthermia as a method of treatment of oncological diseases.
Theoretical approach

Resumen: Magnetic hyperthermia is a progressive method of treatment of cancer and other tumor diseases. The basic idea of this method consists of the injection, into the tumor region, of magnetic nanoparticles, which are subsequently adsorbed on or inside the tumor cells. Under the action of an alternating magnetic field the particles produce heat in the cellular surrounding. If temperature of the tumor region achieves 42°C - 45°C, the ill cells die, whereas the healthy cells survive because of stronger thermal resistivity. That is the key point of the therapeutic method. The most important requirement for the hyperthermia approach is the necessity of the local increase and maintenance of the tumor cell temperature above 42°C and, simultaneously, keeping the healthy tissue temperature within the safety limits. The solution of the practical problem of the achievement and maintenance of the necessary temperature in a local place of an organism requires detailed study of the heat production by the magnetic particles in the given medium. The majority of theoretical studies of the magnetic hyperthermia deal with systems of non-interacting ferromagnetic particles. The obvious way to enhance the therapy effect is increase of the concentration of the injected particles. In its turn, this leads to the necessity to take into account the influence of the interparticle interaction on the

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thermal effect. Some approaches for theoretical determination of the intensity of the heat production in systems of ferromagnetic nanoparticles in liquid and elastic media will be discussed. The presented analysis is based on the mathematically regular approximation of virial expansion with respect to the particles concentration. This approach allows us to achieve the physical results by using strict mathematical methods without any intuitive and heuristic constructions.

Ponente: Andrés Moya Bedón. School of Physics and Astronomy, University of Birmingham (Reino Unido)

Fecha: 5 de febrero de 2017

Lugar y hora: sala de seminarios del edificio Mecenas. De 9.30 horas a 13.00 horas -descanso de 11.00 a 11.30 (3 horas de duración total)

Título: Evaluando el potencial de un planeta de ser habitable

Resumen: Desde el lanzamiento de los primeros satélites dedicados a la búsqueda de exoplanetas, el número planetas conocidos se ha multiplicado exponencialmente hasta llegar a los varios miles. En el futuro, sobre todo con Plato2.0, este incremento se espera que se acelere. Una vez descubiertos, el siguiente paso es estudiar si estos tienen biomarcadores en sus atmósferas. Debido a restricciones técnicas, estos estudios sólo se pueden realizar en uno pocos cientos de planetas. Por lo tanto, la priorización de los potencialmente más habitables de entre los miles de planetas descubiertos es crítica para el éxito de la búsqueda de biomarcadores. Durante el seminario repasaremos todos los índices propuestos para evaluar la similitud de un planeta con la Tierra o su potencial de habitabilidad, veremos en profundidad la física en la que se basan y expondremos los planes futuros para hacer de estos índices una herramienta útil y fiable.

Ponente: Guillaume Ovarlez, Université de Bordeaux (Francia)

Fecha: 22 de marzo de 2018

Lugar y hora: Salón de Grados de la Facultad de Ciencias. De 10.00 horas a 13.30 horas -descanso de 11.30 a 12.00 (3 horas de duración total)

Título: Suspensions of particles and bubbles in complex fluids and shear-induced inhomogeneities

Resumen: The interest is in granular suspensions. These materials (e.g., fresh concrete, lava flows...) are concentrated suspensions of very polydisperse particles (from nm to cm), and involve many different physical interactions (colloidal, hydrodynamic, contacts). They are generally yield stress fluids, which flow only if the applied stress is large enough. Moreover, their behavior depends on flow history, through reversible phenomena (thixotropy...), and irreversible phenomena (shear-induced concentration inhomogeneities...). My goal is to identify the phenomena involved in the behavior of granular suspensions and their microscopic origin, and to model their macroscopic behavior. I mainly perform experimental studies on model

materials. Among other things, I am interested in inhomogeneities, jamming, and macroscopic modelling. I also try to apply some of my results in the field of civil engineering. My focus has been on: (i) suspensions of noncolloidal particles in Newtonian fluids, (ii) suspensions of noncolloidal particles in yield stress fluids, and (iii) simple and thixotropic yield stress fluids. I am now involved in new projects using microfluidic techniques. One of my goal is to design new rheological tools to characterize the tensorial behavior of complex fluids. I also intend to investigate in more details the diphasic behavior of concentrated suspensions.

Ponente: Carlos Drummond. Centre de Recherche Paul Pascal (CRPP) Centre National de la Recherche Scientifique (CNRS), y Universidad de Burdeos (Francia)

Fecha: 27 de abril de 2018

Lugar y hora: Aula B01, Facultad de Ciencias. De 10.00 horas a 13.30 horas - descanso de 11.30 a 12.00 (3 horas de duración total)

Título: Solutions and Dispersions of Nanocarbon forms

Resumen: Several carbon allotropes, like carbon Nanotubes CNT or graphene, show exceptional properties in electronic or heat transport and mechanical resistance. For these reasons, it has been suggested that they can be used as essential ingredient in many materials and devices at the nanoscale. There is an important worldwide research effort to bring these expectations to reality. To allow the integration of these “wonder materials” in real products, it is often necessary to produce uniform and stable liquid formulations containing individualized graphene or CNTs. In these lectures some properties and strategies of dispersion/dissolution of these nanocarbon forms will be discussed.

Ponente: Joaquín Campos Acosta, Instituto de Óptica, CSIC, Madrid

Fecha: 10 y 11 de mayo de 2018

Lugar y hora: Seminario del Departamento de Óptica, Edificio Mecenas. 10.00 a 13.00 (6 horas de duración total -3 horas cada día)

Título: Detectando fotones, desde unos cuantos hasta...

Resumen: Revisar los métodos de detección de fotones en función del número de ellos que hay que detectar, haciendo especial hincapié en los últimos avances producidos en los extremos del rango dinámico: unos pocos fotones y potencias por encima del umbral de daño de los materiales.