

物理科学科・専攻学生各位

外国人特別講師の授業を以下のように行います。

講師 **Prof. Fernando Palacio (University of Zaragoza, Spain)**

滞在期間 2012年4月10日(火)～4月27日(金)

ホスト教員 細越 裕子

授業予定

1. フレッシュマンセミナー (初年次ゼミナール：学部1年向け)

1-1 日時 4月18日(水) 5コマ 場所 A12 (サイエンスホール)

Title: Magnetism in the nanoscale: a basic introduction of principles and applications

※Abstract については別添ポスターで掲示しています。

2. 物理科学総合演習 D (学部3年向け)

2-1 日時 4月11日(水) 2コマ 場所 A14-322

Title: Introduction to magnetism

Abstract:

At first a brief historic account of magnetism and its importance for now day technology is presented. Then, the basic principles of magnetism are explained in a simple way avoiding as much as possible the use of quantum mechanics and statistical physics. Following the motion of an electron in an electric and a magnetic field the concepts of diamagnetism and paramagnetism are introduced. The magnetisation of a paramagnet and the Curie and Curie-Weiss laws are then calculated. All along the lecture interactions between students and the professor in the form of questions and answers are stimulated with the double purpose of forcing the practice of English by the student and maintaining their attention alive.

2-2 日時 4月18日(水) 2コマ 場所 A14-322

Title: Magnetic interactions and magnetic ordering. Basic principles of neutron techniques

Abstract:

In the first part of the lecture and following the previous one, magnetic interactions are introduced in a descriptive way, as it is the interaction Hamiltonian. The concept of magnetic ordering as a second order phase transition is explained together with that of the order parameter and the necessary conditions required for a magnetic system to undergo magnetic ordering. The concepts of spin and lattice dimensionalities are carefully explained together with the effects such dimensionalities have in the magnetic ordering process. The phenomenological behavior of simple magnetic arrangements, such as ferro-, antiferro-, ferri- and weak-ferromagnetism are reviewed using simple experimental cases. In the second part of the lecture, the neutron scattering technique is briefly introduced and compared with the use of x-rays to investigate magnetic phenomena in solids. A description of neutron sources and facilities is also given.

3. サイエンスコミュニケーション I, II (大学院M1, M2向け)

3-1 日時 4月10日(火) 3コマ 場所 A14-322

Title: Basic concepts on Magnetism

(3-1は磁性の基礎的知識を日本語と英語を交えて説明します。)

3-2 日時 4月17日(火) 3コマ 場所 A14-322

Title: Magnetic interactions and magnetic ordering. Introduction to magnetic disorder in solids

Abstract:

In the first part of the lecture magnetic interactions are introduced together with the interaction Hamiltonian. Direct exchange, including SOMO – SOMO and SOMO – LUMO interactions and superexchange interaction are explained with some detail. The concept of magnetic ordering as a second order phase transition is explained together with that of the order parameter and the necessary conditions required for a magnetic system to undergo magnetic ordering. The concepts of spin and lattice dimensionalities are carefully explained together with the effects such dimensionalities have in the magnetic ordering process. The phenomenological behavior of simple magnetic arrangements, such as ferro-, antiferro-, ferri- and weak-ferromagnetism and field-induced phase transitions are reviewed using simple experimental cases. In the second part of the lecture, the disorder types and their effect in magnetic systems are reviewed and discussed. All along the lecture interactions between students and the professor in the form of questions and answers are stimulated with the double purpose of forcing the practice of English by the student and maintaining their attention alive.

3-3 日時 4月24日(火) 3コマ 場所 A14-322

Title: Magnetic disorder in solids: a case example. Basic principles of neutron scattering

Abstract:

Following the introductory presentation of types of disorder in magnetic systems and their effects in the magnetic properties of solids, several simple model systems are explained. Then, the case of substitutional disorder in antiferromagnetic lattices at very low magnetic fields is described and discussed in detail. In the second part of the lecture, fundamental concepts of neutron scattering are introduced and the technique is compared with the use of x-rays to investigate magnetic phenomena in solids. Basic principles of neutron diffraction and polarised neutron experiments are explained and several examples briefly discussed.

3-4 日時 4月25日(水) 16:00~17:30 場所 A12 (サイエンスホール)

Title: Thermometry in the nanoscale

※Abstractについては別添ポスターで掲示しています。

(この時間の授業は物理科学セミナーを兼ねています。)

以上。