erc Advanced Grants
European Research Council
Established by the European Commission

enimus
investigation of the enantiomeric imbalance in the solar system through ultraviolet spectropolarimetry

PRESENTATION OF THE PROJECT ENIMUS

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DESCRIPTION OF THE JOB OFFERT: 4 PhD CONTRACTS

LOCATION: SALA DE GRADOS de la FAC CC MATEMÁTICAS/UNIV. COMPLUTENSE
DATE & TIME: JUNE 19th, 13:00-14:30
ON-LINE ATTENDANCE: CONTACT SEC.AEGORA@UCM.ES

ENIMUS PURPOSE:

Amino acids and the reference nucleobases for RNA and DNA can be formed in space ice under high energy, vacuum ultraviolet (VUV) irradiation. This statement is based on twenty years of laboratory research and has profound implications in the understanding of the emergence of life in the Cosmos, the universality of the processes involved and the compatibility of life forms across the Universe.

This laboratory work still needs to be confronted with actual, on-field measurements. Promising data have been obtained through in-situ techniques: the analysis of carbonaceous chondrites such as the Murchinson meteorite or the detection of Glycine in the coma of comet 67P/Churyumov-Gerasimenko and Uracyl in the asteroid Ryugu. Unfortunately, neither of these techniques suits well a systematic investigation. Meteorites reaching the Earth surface represent a reduced and biased subset and contamination by Earth-based amino acids needs to be carefully controlled. Space probes are very costly and limited in scope given the constraints in space navigation. Thus, it is crucial to develop remote detection techniques to carry out a comprehensive study of the distribution of amino acids within the Solar System, their relative abundances and their enantiomeric imbalance. According to recent estimates, this is possible at VUV wavelengths for optically active amino acids such as the very abundant alanine.

The interaction between VUV radiation and optically active amino acids in space bodies is yet poorly studied. The formation of crystallites and complex structures, the interaction between the various molecules, the dependence on the VUV photon energy, polarization and flux needs to be quantified prior to any attempt of remote detection in the Solar System. ENIMUS aims to carry such in-depth study and develop a laboratory prototype of the space instrument for this investigation.

JOB OFFER DESCRIPTION:

PhD 1: Image processing of data from microscopy and spectro-polarimetry.
PhD 2: Simulation of the backscattered radiation from relevant mixtures of space particles in the 140-240 nm range.
PhD 3: Evaluation of the optimal targets in the present-day Solar System to detect the signal of alanine.
PhD 4: Study of the chemical impact of far-UV radiation on amino-acids and amino-acids mixtures with space ices.

The offer is open to graduate students in scientific disciplines & engineering. Candidates with a strong background in physics, mathematics and/or chemistry are especially invited to attend the meeting and submit applications.

IMPORTANT: Job Offer will open on July 1st and will be closed on July 20th.

During the meeting, a detailed description of the project, the team, and the PhD projects will be addressed.