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REQUEST FOR PARTICIPATION OF INTERNATIONAL PARTNER COUNTRY
TO COST ACTION CA18108, QUANTUM GRAVITY PHENOMENOLOGY IN THE MULTI-MESSENGER APPROACH

1. 1. MANAGEMENT COMMITTEE AND Head Of Science Operations APPROVAL

The COST Action CA18108 Management Committee approved By Written Procedure on 29 June 2020, the request for a International Partner Country participation, based on scientific merits.

Name of International Partner Country

NAME	Universidad Autónoma de Chiapas (UNACH)
ADDRESS	Facultad de Ciencias en Física y Matemáticas Carretera Emiliano Zapata Km. 8 Rancho San Francisco, Ciudad Universitaria, Terán Tuxtla Gutiérrez, Chiapas
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Name of representative to COST Action CA18108

DEPARTMENT	FCFM-UNACH
NAME	Dr Humberto Martínez-Huerta
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Request validated by COST Association Science Officer Dr Ralph Stuebner
This request was reviewed by the COST Head Of Science Operations, and validated on 7 July 2020, based on the scientific merits.

2. PRESENTATION OF INTERNATIONAL PARTNER COUNTRY AND ITS REPRESENTATIVE

The Facultad de Ciencias en Física y Matemáticas (FCFM) at the Universidad Autónoma de Chiapas (UNACH), is a young interdisciplinary research Institution, whose areas of research include four main groups, theoretical and fundamental physics, experimental and applied physics, mathematics, and applied mathematics. It has 27 research chairs working in the different subjets of physics and mathematics. On the subgroups, there is the astroparticle physics group, where its members have active participation within the International Collaborations for experiments such as the Pierre Auger Observatory, the High Altitude Water Cherenkov (HAWC), JEM-EUSO, ESCARAMUJO, LAGO, MATHUSLA, and the Southern Wide-field Gamma-ray Observatory (SWGO) initiative. The FCFM-UNACH has a deep collaboration with the Mesoamerican Centre for Theoretical Physics (MCTP), which was created in collaboration between the Abdus Salam International Centre for Theoretical Physics (ICTP) and UNACH in order to establish a regional headquarters of the ICTP in Central America, the Caribbean, and Mexico. The FCFM-UNACH recently founded one of the most important High-Performance Computing Centers of the region, LARCAD, based on a donation of equipment from CERN, which the candidate has access to his research work. The candidate is Dr. Humberto Martínez Huerta, which is affiliated at FCFM-UNACH. He has more than ten years of experience in the field of astroparticles, both in the development of phenomenology and in data taking and analysis. He has collaborated with the Pierre Auger experiment since 2007, in studies of cosmic ray composition and propagation with new physics, and with the HAWC observatory since 2011 in testing signatures of Physics beyond the Standard Model, and data quality test of HAWC data. He has experience working on Fundamental Physics for the sensitivity studies of the next gamma-ray telescope, the Cherenkov Telescope Array (CTA), and for the proposals of the HAWC type observatory at the southern hemisphere, the Southern Gamma-ray Survey Observatory (SGSO) and SWGO. He is part of the Mexican Division of Cosmic Rays and the Division of Particles and Fields, the Mexican Society of Physics, and a member of the National Research System since January 2019. Dr. Martínez-Huerta earned its doctorate in physics in 2017 at CINVESTAV, México, within a theoretical-phenomenological profile with a manifest interest in collaborating with theory and experiments. He had three years of postdoctoral research experience working at IFSC-USP, Brazil, to develop techniques and tests for Lorentz Invariance Violation (LIV) with astroparticles.

3. BACKGROUND INFORMATION

The shortcomings of the unification proposals made so far suggest that our understanding of space-time is not complete and that fundamental modifications must be made to contemplate quantum effects. In this context, LIV has been suggested as an element with the potential to provide some ansatz towards the path to a unifying formalism; the formulation of the quantum view of gravity is one of the main challenges of physics, and some proposals may motivate a LIV. Dr. Martínez-Huerta has mainly worked on modeling, classifying, and searching for this type of LIV signals in the photon sector, through photo-production and decay processes in cosmic and gamma rays, which has led him to develop techniques that have generated stringent exclusion limits through different astroparticle channels. Dr. Martínez-Huerta has provable experience in fundamental physics with astroparticles, the propagation and detection of primary cosmic and gamma rays, and the search for phenomena beyond the standard model of particles, as well as in outreach activities. His most recent publication is -Constraints on Lorentz invariance violation from HAWC observations of gamma rays above 100 TeV-, within the HAWC Collaboration. He and the HAWC work team conducted a dedicated LIV search for superliminal signatures; although they report an absence of LIV signatures, they reach robust limits under several uncertainties. Dr. Martínez-Huerta had also tested other LIV signatures in gamma-ray propagation and innovated in analysis techniques, forecasting new LIV exclusion limits, which are also solid under several uncertainties. He has a keen interest in deepening in the various LIV tests, the theoretical motivations, and outcomes; therefore, he is very interested in contributing with the COST efforts.

4. DESCRIPTION OF MUTUAL BENEFITS

4.1 Benefits for COST and for the COST Action

The participation of Dr Humberto Martínez-Huerta, representing the astroparticle physics group at Universidad Autónoma de Chiapas (UNACH), Mexico, would be very positive for our Action. Dr Martínez-Huerta is an expert in the search for quantum gravity signatures in the physics of two cosmic messengers, gamma rays and cosmic rays, both in theoretical and experimental aspects. He has collaborated for many years in two major experiments of these cosmic messengers, HAWC (since 2011) and Auger (since 2007). His knowledge about data taking and analysis aspects, and about the physics of the propagation and detection of the cosmic messengers, together with that of phenomenological models we would like to test, will be most useful for the objectives of our Action. For these reasons, our COST Action would greatly benefit from the participation of Dr Martínez-Huerta.

4.2 Benefits for the International Partner Country

The FCFM-UNACH, México, is a young interdisciplinary research Institution, with interest in theoretical and fundamental physics and active participation on international astroparticle Experiments. The participation in the COST Action of Dr. Humberto Martínez-Huerta would extend the development opportunities of young scientists and students in the research interests of the Institution. Therefore, his participation would be hugely beneficial for the local group and the Institution.

4.3 Brief description of targeted scientific activities, including Working Groups selected for cooperation

Dr. Humberto Martínez- Huerta is interested in fundamental physics, and especially he has a keen interest in deepening in the various LIV tests, the theoretical frameworks, motivations, and outcome. Therefore, he is interested in contributing and participating in the activities of WG2, WG3, and WG5.

5. ADDITIONAL COMMENTS / REMARKS

Not required.