XXXII Simposio Peruano de Física – 1er Congreso Internacional de Física 2026

Report of Contributions

Contribution ID : **163** Type : **Short communications**

Fast Models of Multiple Lyman-Alpha Scattering for Exospheric Inversion

Lyman-alpha observations are widely used to study hydrogen exospheres. At high altitudes, measured intensity can often be approximated as proportional to hydrogen density integrated along the line of sight. At lower altitudes, the exosphere becomes optically thick, and absorption and multiple scattering produce a nonlocal relation between density and observed intensity. Full radiative-transfer calculations capture these effects, but their computational cost limits their use in inverse models requiring many forward evaluations.

We compare two approaches to reduce this cost. The first uses a surrogate model trained on high-fidelity radiative-transfer calculations. Rather than replacing the physical model, the surrogate predicts corrections to optically thin or single-scattering intensity caused by attenuation and multiple scattering. The second reduces the multiple-scattering operator itself using low-rank, reduced-basis, and simplified representations that preserve the main spatial coupling with fewer calculations. Both methods will be tested on the same asymmetric hydrogen distributions and viewing geometries. We will compare radiance errors, execution times, memory requirements, performance across optical depths, and sensitivity to density and temperature parameters. Our goal is to identify a fast, accurate radiative-transfer approximation suitable for retrievals of exospheric structure from Lyman-alpha images, including observations from the Carruthers Geocorona Observatory.

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Session Classification : ASTROFISICA Y CIENCIAS ESPACIALES

Contribution ID : **164** Type : **Poster**

Numerical Study of Ultra-High-Energy Cosmic-Ray Propagation and Cosmogenic Neutrinos

This work investigates the cosmological propagation of ultra-high-energy cosmic-ray (UHECR) protons and the associated production of cosmogenic neutrinos. We model the interaction of UHECRs with the cosmic microwave background (CMB) and the extragalactic background light (EBL), including adiabatic energy losses, electron–positron pair production, and photopion production. A Python-based numerical solver is developed to evolve the coupled proton and neutrino transport equations over cosmological redshift using vectorized matrix operations. The resulting spectra at Earth allow us to study the attenuation of the UHECR proton flux, the emergence of the high-energy suppression associated with photopion interactions, and the corresponding production of cosmogenic neutrinos. In addition, the contribution of different source-redshift intervals is analyzed to investigate the cosmological origin of the observed proton and neutrino fluxes.

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Session Classification : HEP - NUCLEAR - F.MEDICA

Contribution ID : **165** Type : **Short communications**

Distribución espacial de las concentraciones residenciales de radón e incidencia de cáncer de pulmón según unidades geológicas en cinco distritos de Cusco, Perú

Introducción: En Cusco existe información sobre concentraciones residenciales de radón, pero es limitada la evidencia que integre espacialmente con la incidencia de cáncer de pulmón y las unidades geológicas.
Objetivo: Explorar la relación del radón, cáncer de pulmón y las unidades geológicas en cinco distritos de Cusco.
Materiales y métodos: Se realizó un estudio observacional ecológico utilizando datos secundarios. Las tasas de incidencia de cáncer de pulmón del periodo 2020–2025 se calcularon a partir de registros de la GERESA Cusco y REUNIS. La información geológica se obtuvo de GEOCATMIN-INGEMMET. Se calculó la correlación de Spearman entre radón y las tasas de incidencia. Asimismo, se realizó un análisis cartográfico integrado de radón, la incidencia y las unidades geológicas.
Resultados: La mayor concentración de radón correspondió a Santiago (108,65 Bq/m^3)que también presentó la mayor tasa de incidencia de cáncer de pulmón en 2021 (100,92 por 100 000 habitantes). Se observó una correlación positiva entre radón e incidencia de cáncer de pulmón en 2021 (ρ=0,80; p=0,104) y 2024 (ρ=0,70; p=0,188), sin significancia estadística. Se encontró una asociación entre determinadas formaciones geológicas y mayores concentraciones de radón.
Conclusiones: La correlación positiva observada sugiere un patrón ecológico compatible con una posible relación entre ambas variables

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Session Classification : HEP - NUCLEAR - F.MEDICA