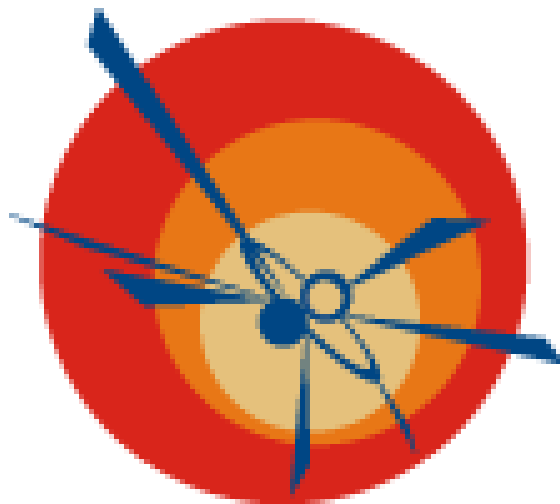


Workshop da Rede Nacional de Física de Altas Energias (RENAFAE) 2022

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Livro de Resumos

Resultados e previsões de processos de produção exclusiva para o experimento LHCb

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Comparações entre resultados do experimento LHCb e previsões teóricas para produção exclusiva do méson vetorial J/ψ em colisões pp e PbPb serão apresentadas. Também discutiremos perspectivas de análises de dados propostas para o experimento LHCb em trabalhos de fenomenologia relacionados à Física difrativa.

Sessão 2 / 54

Astropartículas como uma importante fonte de estudo para a violação da invariância de Lorentz

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A invariância de Lorentz é uma das principais simetrias que governam o Modelo Padrão de partículas elementares. Todavia, diversos modelos teóricos para uma grande unificação acomodam ou até mesmo impõe certo nível de violação da invariância de Lorentz (VIL). Efeitos significativos são esperados apenas nas mais altas energias. Astropartículas estão entre os eventos mais energéticos conhecidos no Universo, chegando a energias algumas ordens de magnitude maiores que as atingidas em aceleradores na Terra. Somado a isso, estas partículas percorrem longas distâncias, potencializando possíveis efeitos. Com isso, experimentos atuais de astrofísica de partículas possuem precisão experimental suficiente para ocupar um papel de liderança na busca por sinais de VIL. Neste trabalho, apresentarei uma revisão dos recentes esforços para se testar VIL utilizando astropartículas. Em particular, tratarei do caso de raios gama TeV medidos com telescópio atmosférico de luz Cherenkov e do caso de fótons e raios cósmicos de altíssima energia medidos pelo Observatório Pierre Auger.

Sessão 2 / 55

Indirect Dark Matter Searches with Gamma-ray Observatories

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Astrophysical observations of high-energy gamma-rays play a crucial role in the exploration of non-thermal phenomena in the Universe in their most extreme and violent forms. It can also provide unique information about exotic Particle Physics phenomena beyond the Standard Model of Particle Physics, which complements the studies performed at particle accelerators such as the Large Hadron Collider (LHC). For instance, an intense gamma-ray production might be expected from the annihilation of non-baryonic dark matter in dense environments. Therefore one of the main goals

of gamma-ray astronomy is to observe structures in which dark matter is expected to be highly concentrated, such as the dwarf spheroidal galaxies of the Local Group and the Galactic Centre, in order to detect a possible annihilation signal. Several observation campaigns were launched by ground-based Cherenkov telescopes and gamma-ray telescopes embarked on satellites towards these objects. In the absence of clear signals, constraints on the dark matter particle annihilation cross-section have been derived in different particle physics scenarios expecting to produce both a continuum and a line-like gamma-ray flux. A highlight of the most recent and sensitive results of Imaging Atmospheric Cherenkov Telescopes (H.E.S.S., MAGIC and VERITAS) and Fermi-LAT telescope is presented. Lastly, in the light of the future Cherenkov Telescope Array (CTA) and the Southern Wide-Fielded Gamma-ray Observatory (SWGGO), the prospects and strategies in the search for dark matter annihilation signals are discussed.

Sessão 1 / 56

Main results of the Pierre Auger Observatory and prospects for the upgrade AugerPrime

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The Pierre Auger Observatory is the largest facility ever constructed to study ultrahigh-energy cosmic rays. Its main goal is to get clues about the nature and origin of the highest-energy cosmic rays observed so far - above 10^{18} eV. The Auger Observatory is situated at a privileged location in the Argentinean pampas, near the town of Malargüe (35.2°S) at 1400 m above sea level. Two complementary techniques are exploited to detect air showers induced by primary cosmic rays of extreme energies impinging on Earth and interacting in the atmosphere: surface detector and fluorescence telescope arrays, covering an area of 3000 km². Over the years, new detectors and facilities have been installed to enrich the quality of the measurements.

Operated by an international collaboration of about 400 scientists from 100 institutions in 17 countries, the Auger Observatory has continuously taken data since 2004. Brazilian scientists participate in the Auger Collaboration since its beginning in 1995 and count with the support of RENAFAE since the creation of the network.

The experimental data gathered by the Auger Observatory measuring cosmic rays, photons, and neutrinos to high-energy particle interactions have challenged our understanding of the Universe at the highest energy frontier. In parallel, the data have allowed setting limits to phenomena predicted from different theories, such as axions, superheavy dark matter particles, and Lorentz invariance violations.

Recently, the Observatory has produced ground-breaking results in astrophysics, such as the first detection of an anisotropic signal and the measurement of the energy spectrum with unprecedented resolution showing unknown structures.

In this talk, we will report the main results already obtained and highlight the future of the Pierre Auger Observatory with the new detectors for the upgrade AugerPrime in course. AugerPrime focuses on achieving mass-composition sensitivity for each air shower measured by its upgraded surface detector through multi-hybrid observations. The participation of the Brazilian community will also be addressed.

Sessão 2 / 57

Prospects for the detection and spectral characterization of BLLacs with the CTA extragalactic survey

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