



Dipartimento di Fisica
Università di Cagliari
INFN, Sezione di Cagliari



HIGH ENERGY PHYSICS COLLOQUIA

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GALACTIC ELECTRONS AND POSITRONS: INTERPRETATIONS AND MULTI-MESSENGER CONSTRAINTS

Abstract

The flux of cosmic ray (CR) electrons and positrons (e^- and e^+) is now measured with unprecedented statistics and precision up to energies of few tens of TeV.

Recently, a cut-off in the inclusive ($e^+ + e^-$) spectrum has been observed by the DAMPE experiment at 0.9 TeV, while AMS-02 confirmed the presence of an excess of e^+ with respect to standard CR models starting from few hundreds of GeV. The theoretical interpretation of the observed fluxes is still under debate. Different source models have been proposed, including Supernova Remnants (SNRs), Pulsar Wind Nebulae (PWNe) and most intriguingly the annihilation or decay of dark matter (DM) particles in the DM halo of our Galaxy. Because of intense radiative losses in the interstellar medium, high energy e^- and e^+ are an incredible window on Earth's local Galactic environment, in particular on the properties of possible local and discrete sources.

In this seminar I will discuss our current understanding of the sources and propagation of Galactic e^- and e^+ , with a special focus on the backgrounds for a DM signal coming from known astrophysical sources.

In particular, I will show the constraints on local sources such as SNRs and PWNe obtained from a multi-messenger analysis that combines the data on the CR $e^+ + e^-$ flux, its angular distribution, and the observations of candidate sources from radio to gamma-rays.

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