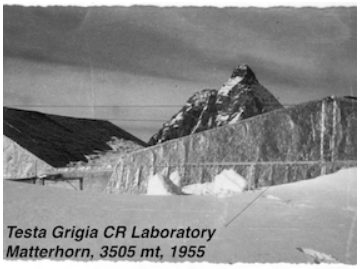

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Antimatter observations in cosmic rays: cross-field hypotheses and consequences consistency

Thursday, 8 September 2016 11:00 (15 minutes)

The antimatter-to-matter ratio in cosmic rays must fit, at once, in the overall scenario of secondary particle production
in the interstellar medium and of antiparticle generation in
astrophysical and, possibly, exotic sources. In order to estimate the dark matter contribution, for instance, the role of all possible astrophysical sources should be definitely excluded or subtracted. Several attempts were carried out in the literature to explain the
the excess of positrons with respect to the secondary component. Basically, all of them reproduce the trend of the observations by
setting the parameters of various models within reasonable ranges.
We investigate the consistency of the hypotheses at the basis of these models with correlated observations proper of other fields of investigation, including gravitational waves after the recent discovery.
The consistency of different observations leads to hypotheses selection and unique predictions of e+ measurement trend up to TeV energies.

Summary

Cosmic-ray observations reaveal an excess of positrons above 7 GeV with respect to the expected secondary component. e+ measurements must be consistent with other correlated observations when different assumptions are made about the origin of this excess. Recent multi messenger observations from astrophysical sources, including high-energy pulsed photons and upper limit on gravitational wave emission from pulsars for instance, allow us to infer precious clues on the reliability of various hypotheses at the basis of models for e+-e- production. The role of supernova fallback matter and disk formation around the same sources may play a relevant role that must be discussed and taken into account. We go through the most recent electromagnetic and gravitational wave interferometer observations and upper limits from compact sources in order to make projections for future positron measurements at TeV energies.

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