Pamela and Fermi data: A new background for future dm searches?

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The positron fraction and the total electron flux were recently measured by Pamela and Fermi.

An excess in the $e^+$ fraction was reported by Pamela. Fermi measured the total $e^+ + e^-$ flux.
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The dark matter interpretation of the data has several problems

Large annihilation rates and unusual final states

Boost factors or non-thermal dm
Leptonic channels are favored

Vanilla DM models cannot explain the data

Neither SUSY candidates, nor LKP, nor scalars, etc.

Viable models have to be carefully arranged

MultiTeV masses
Final states: $\mu^+\mu^-, \tau^+\tau^-, 4\mu$
DM models that can explain Pamela and Fermi are tightly constrained by experimental data

They predict large \( \gamma \) and radio fluxes

Additional constraints from BBN, CMB

Fermi will test the DM interpretation through IC

Figure from arXiv:0905.0480
If astrophysical positrons account for the data they constitute a new background to dm searches.

Pulsars are natural sources of high energy positrons.

The $e^+$ flux is mainly determined by the data.

Detecting a $e^+$ signal from dm will be more challenging.
We study the effect of this new $e^+$ background on the detectability of a dm positron signal

We analyze 4 dm models:

\[ \chi\chi \rightarrow b\bar{b}, W^+W^-, e^+e^- \]

A typical KK model

$\langle \sigma v \rangle$ and $m_\chi$ are taken as free parameters

We consider the prospects for detection at AMS-02
To be detectable, the dark matter signal has to be only slightly larger than previously believed.

For the $b\bar{b}$ and $W^+W^-$ models a 10% increase is needed.

For the KK model $\langle \sigma v \rangle$ must be 40% larger.

For the $e^+e^-$ model the signal has to be twice as large.
A positron signal from dark matter annihilations is still within the reach of future experiments.

The $e^+e^-$ model requires the smallest $\langle \sigma v \rangle$

$\text{Dm with } m_\chi \lesssim 400 \text{ GeV is within reach}$

AMS-02 may reveal a dark matter positron signal