

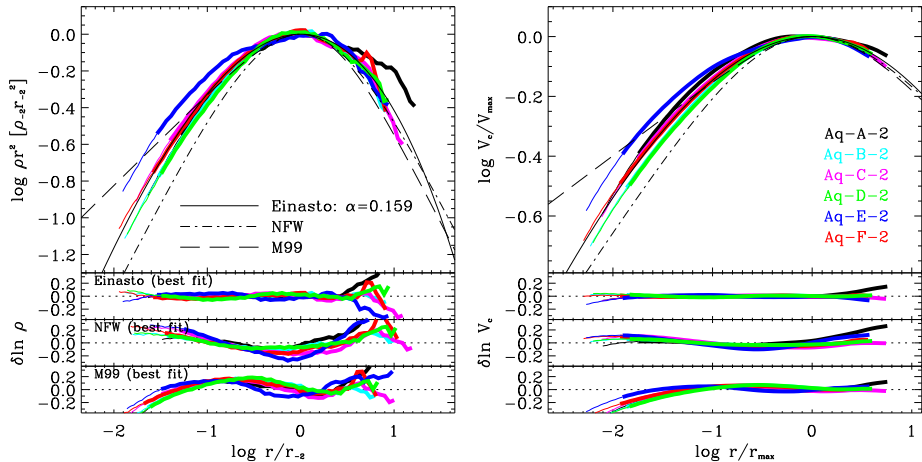
# Indirect dark matter detection

Joachim Kopp

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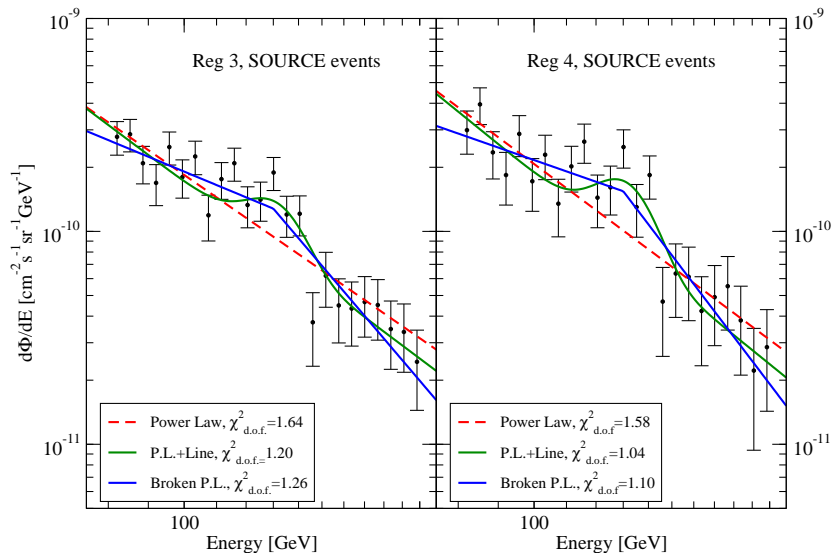
April 10, 2014

# Predicted halo profiles from the Aquarius simulation



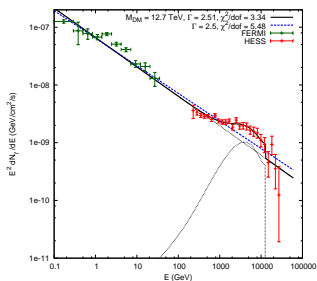
Navarro et al. arXiv:0810.1522

# Gamma ray spectrum from the galactic center (1)

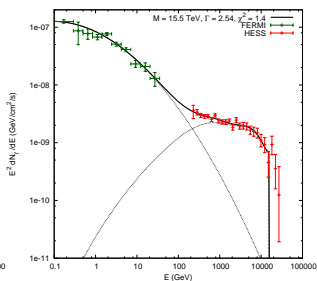


Profumo Linden arXiv:1204.6047

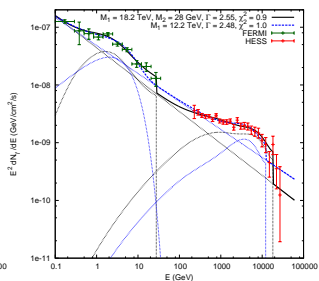
# Gamma ray spectrum from the galactic center (2)



(a)



(b)

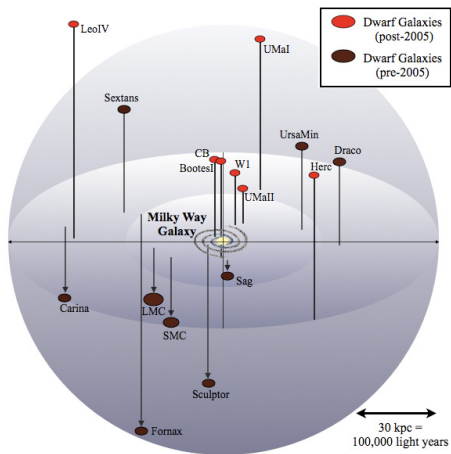


(c)

- (a) power law + DM
- (b) pulsar + DM
- (c) power law + DM + pulsar / power law + 2 DM annihilation channels

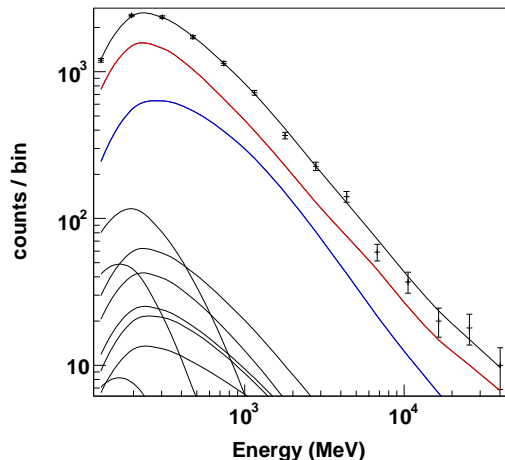
Belikov Zaharijas Silk arXiv:1207.2412

# Gamma rays from dwarf galaxies



- Dwarf galaxies: cluster of  $1000-10^9$  stars bound to the Milky Way
- Consist mostly of dark matter (most visible matter has been stripped away during passages through the galactic disk)
  - ▶ Low background

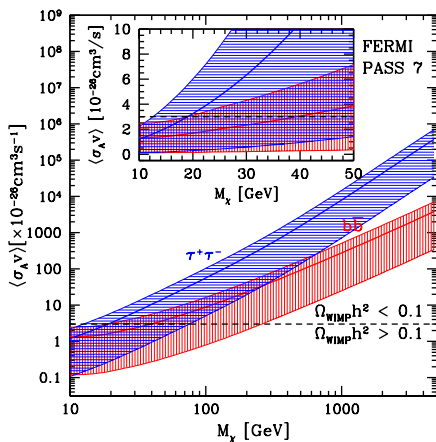
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Fermi-LAT arXiv:1001.4531

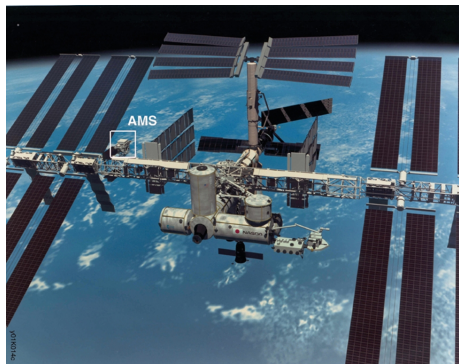
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Geringer-Sameth Koushiappas arXiv:1108.2914

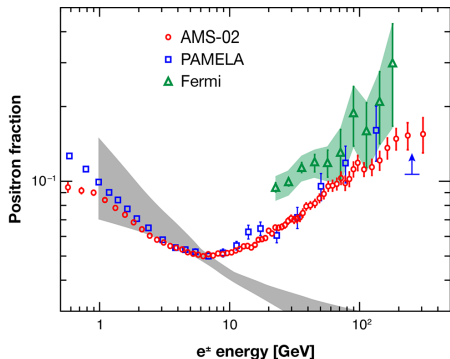
# The cosmic ray positron fraction



- AMS-02: particle detector on the International Space Station
- April 2013: measurement of the positron fraction  $\phi(e^+)/[\phi(e^+) + \phi(e^-)]$
- Pronounced excess of positrons (confirms previous results by PAMELA and Fermi-LAT)
- Possible explanations
  - ▶ Pulsars
  - ▶ Dark matter
  - ▶ ???



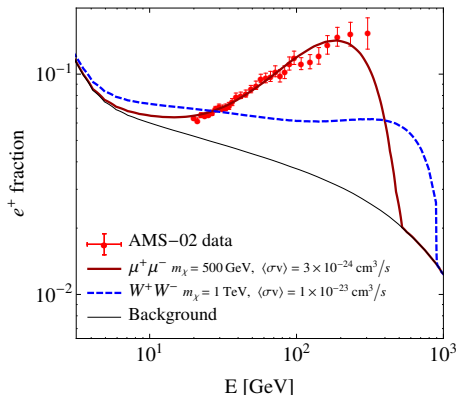
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AMS-02, 2013

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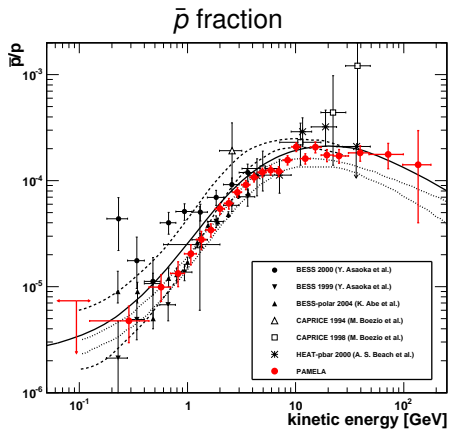
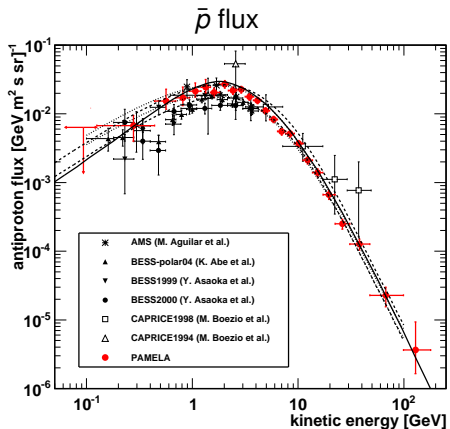
# The cosmic ray positron fraction



JK arXiv:1304.1184

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# Cosmic antiprotons



PAMELA arXiv:1007.0821

- Measurement consistent with predictions
  - ▶ Tight constraints on hadronic DM annihilation channels