A LIGHT IN THE DARK: 
the PURSUIT OF THE NATURE OF 
DARK MATTER

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Evidence for the existence of dark matter
This is evidence for the *existence* of dark matter...

... but what *is* it?
Theory of Dark Matter
Evidence for the existence of dark matter
Detecting Dark Matter
Detecting Dark Matter

Collider

Direct

Indirect
a Payload for Antimatter Matter Exploration and Light-nuclei Astrophysics
PAMELA

[Image of a spacecraft]

Position fraction $\Phi(e^-)/\Phi(e^+ + e^-)$ vs. Energy (GeV)

- Muller & Tang 1987
- MASS 1989
- TS93
- HEAT94+95
- CAPRICE94
- AMS98
- HEAT00
- Ciem & Everson 2007
- PAMELA
Advanced Thin Ionization Calorimeter

Fermi Gamma-Ray Space Telescope
ATIC

Fermi
Wilkinson Microwave Anisotropy Probe
designed to measure the Cosmic Microwave Background (CMB, whole separate chalk talk)... 

...but also observes the Milky Way
Dobler & Finkbeiner (2008)

**WMAP**

- total synchrotron
- microwave “haze”
WMAP

Model  Data  Data - Model

Finkbeiner (2004)
Fermi

5 GeV < E < 10 GeV

5 GeV < E < 10 GeV residual (1 < E < 2 GeV)

total gamma-rays

gamma-ray “haze”

Dobler et al (2009)