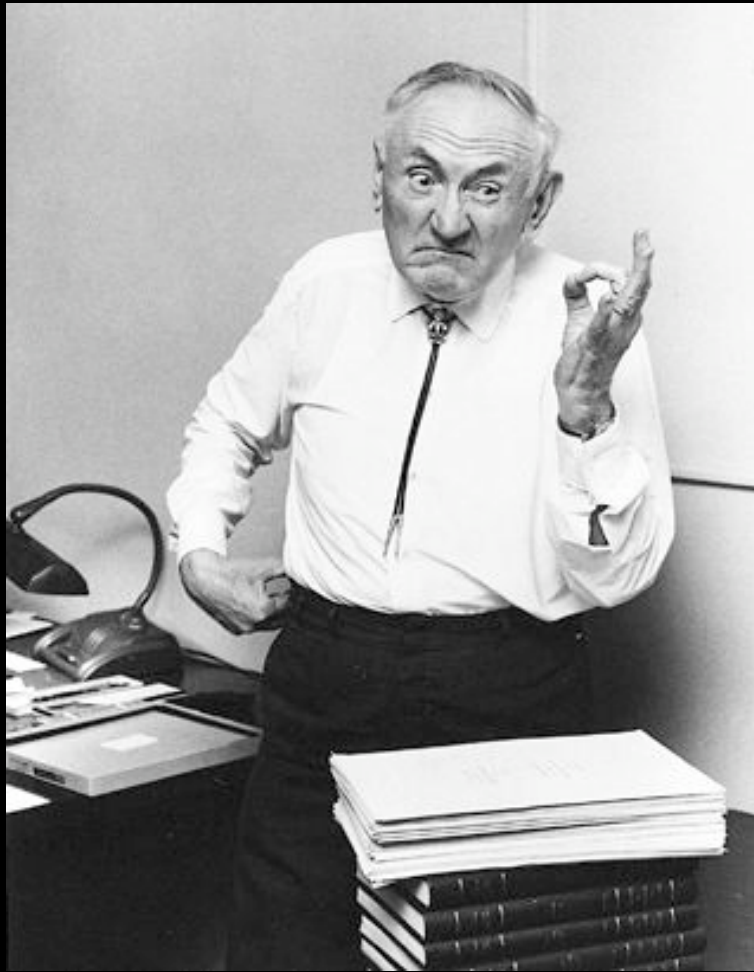


A LIGHT IN THE DARK:
THE PURSUIT OF THE NATURE OF
DARK MATTER

Greg Dobler

January 28th, 2010 - KITP

Evidence for the existence of dark matter

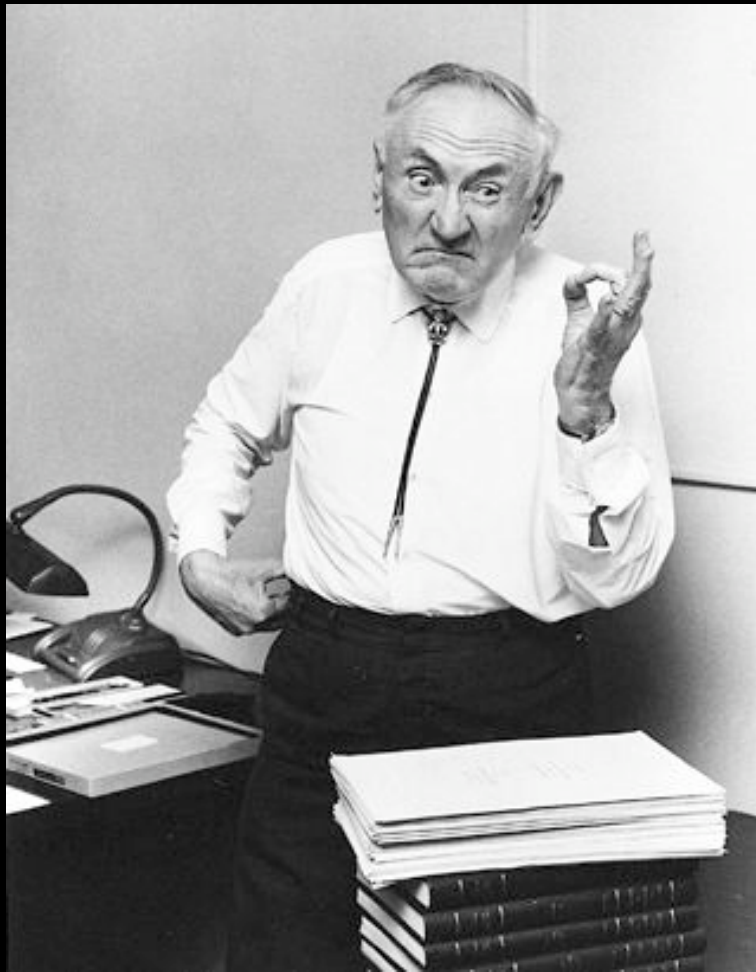


Fritz Zwicky

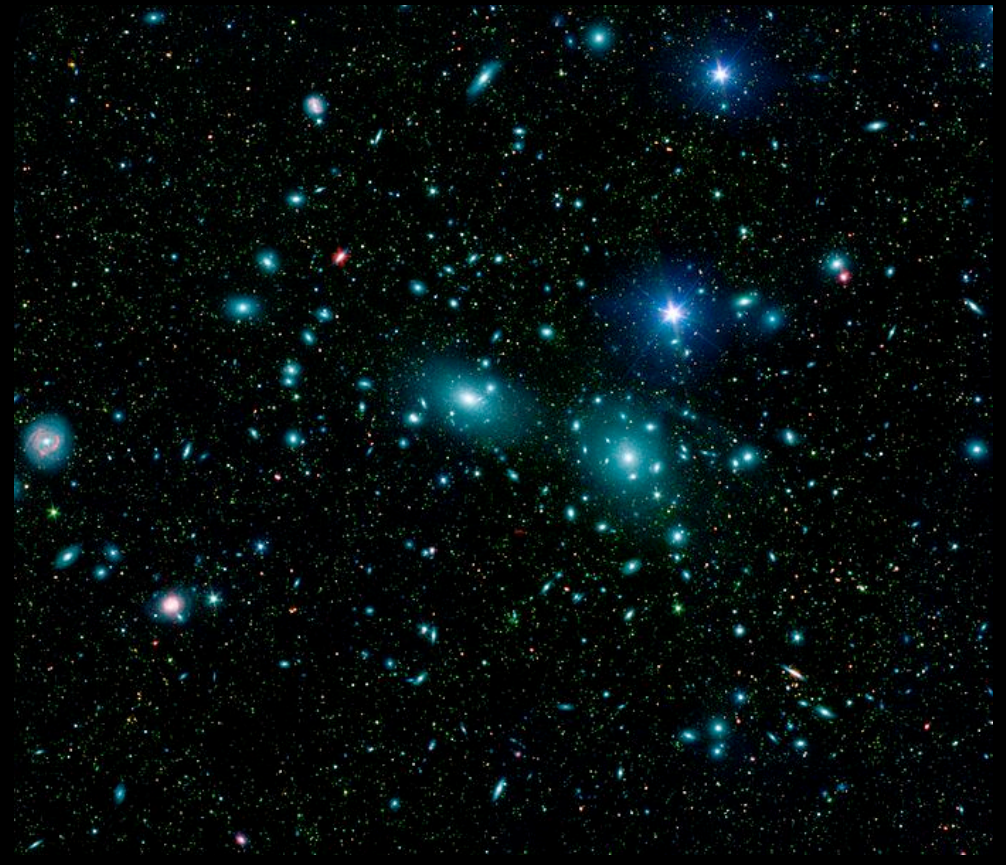


Scanned at the American
Institute of Physics

Vera Rubin



Fritz Zwicky

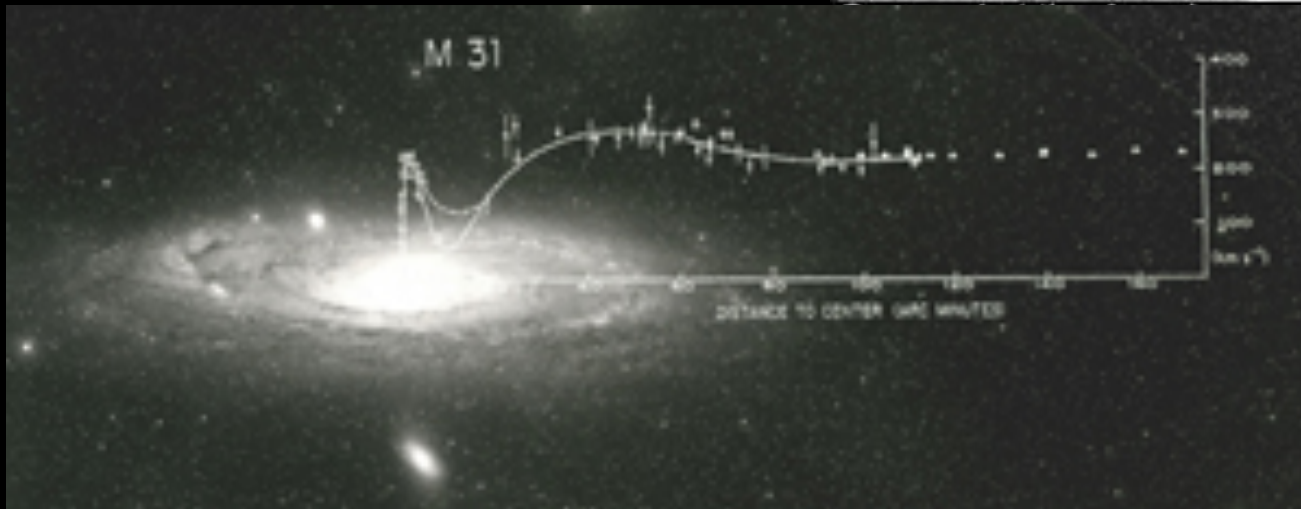


Coma Cluster

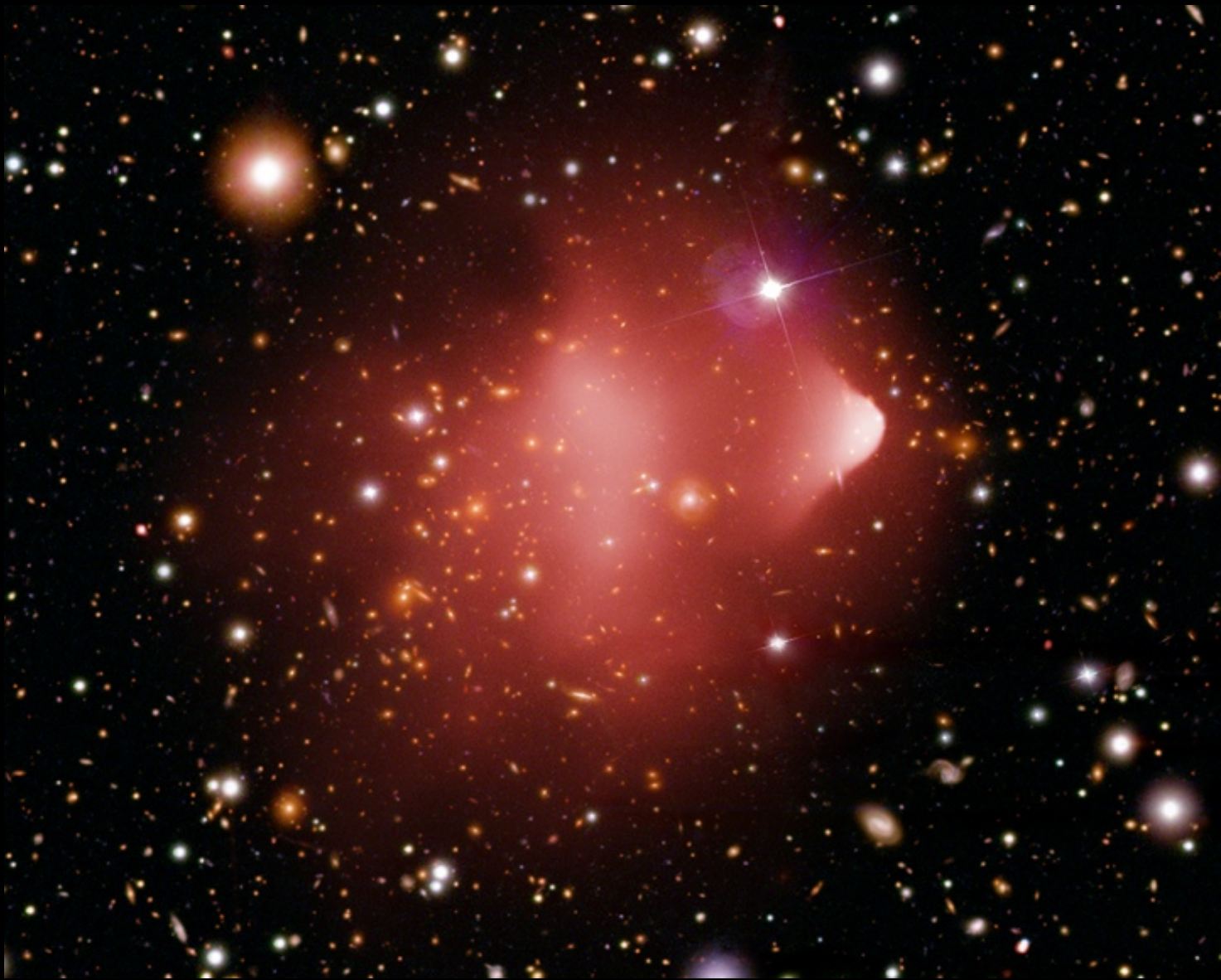
1933



Vera Rubin

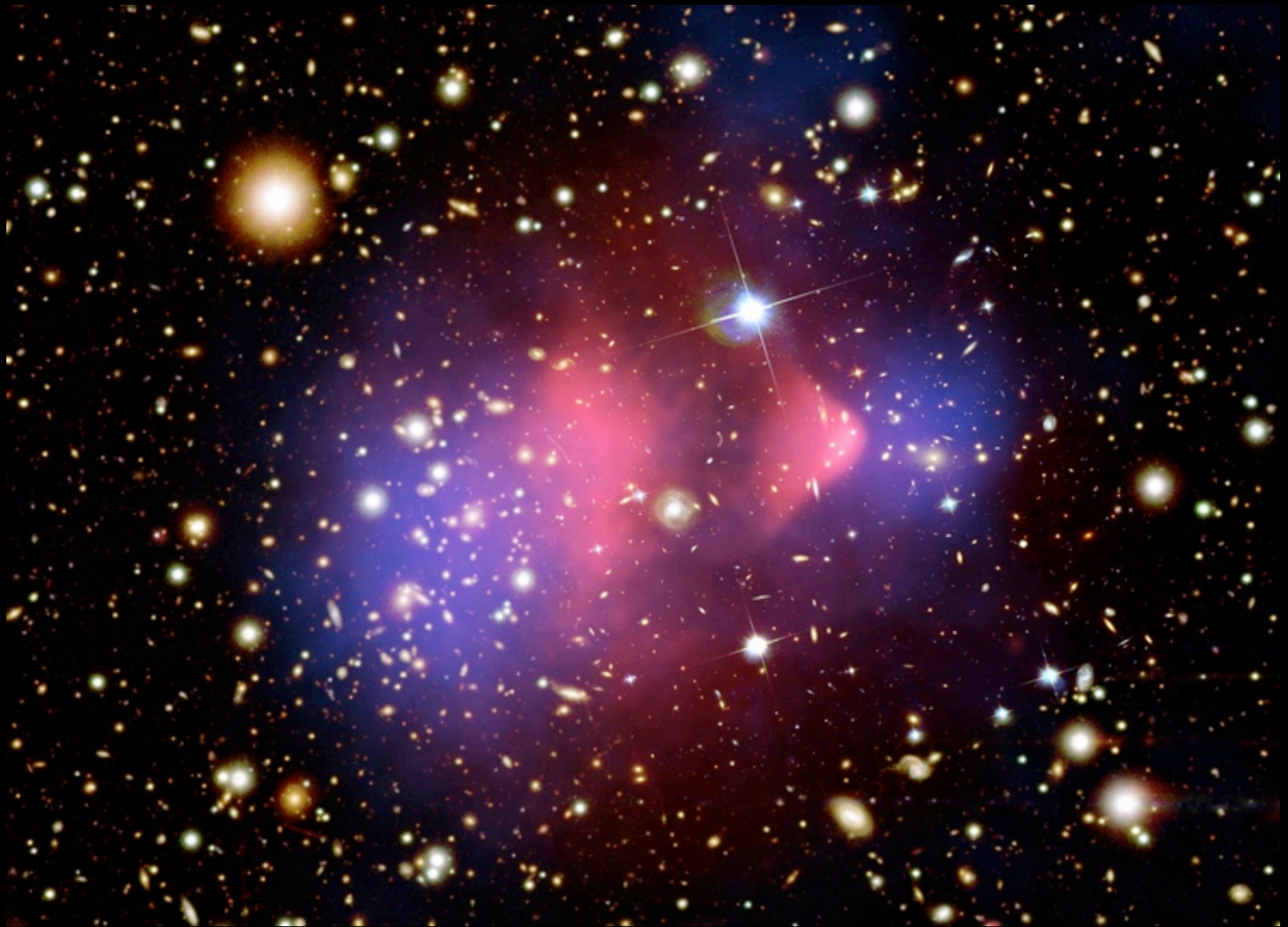


1975



Douglas Clowe, et al

2006



Douglas Clowe, et al

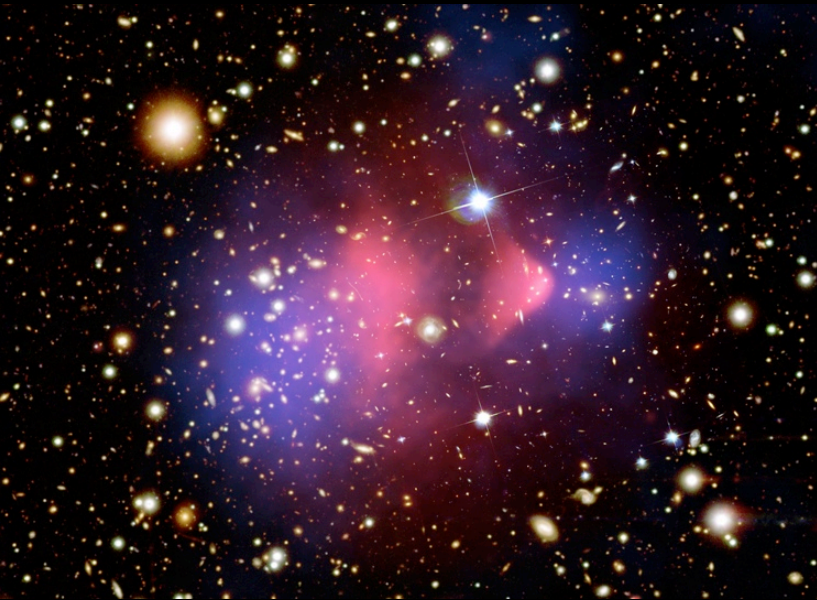
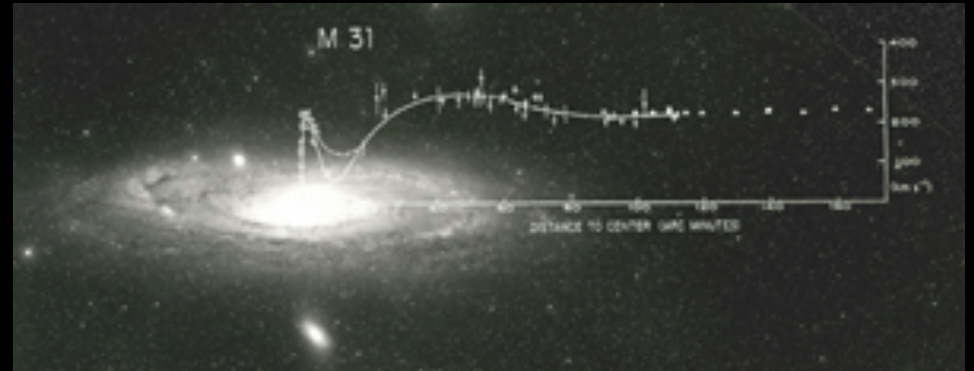
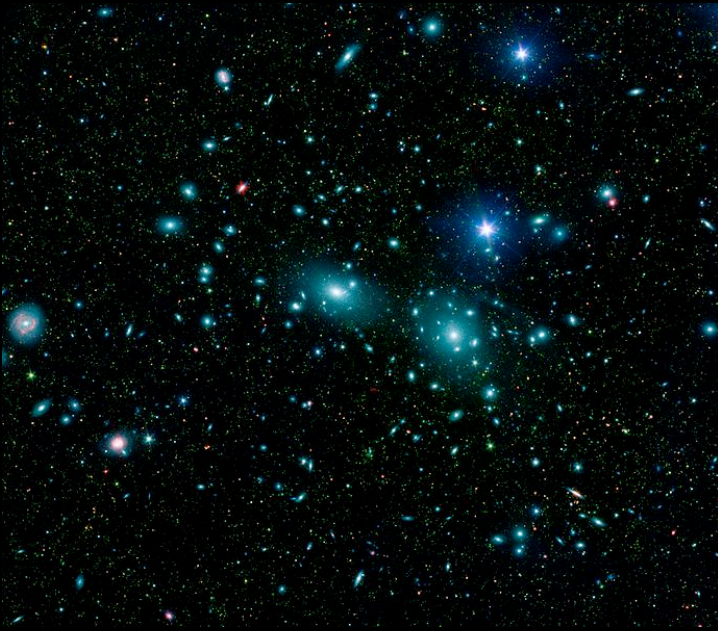
2006

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

... but what is it?

Theory of Dark Matter





Evidence for the
existence of dark matter

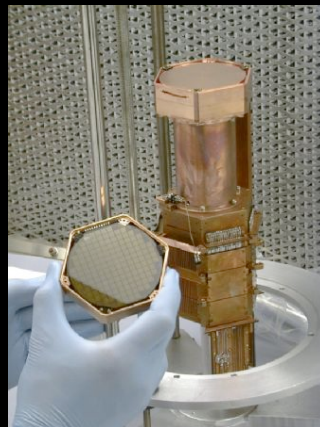
Detecting Dark Matter

Detecting Dark Matter

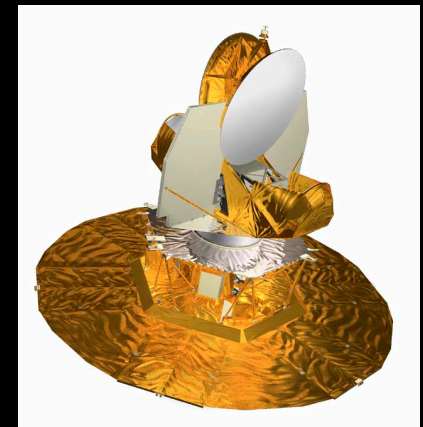
Collider



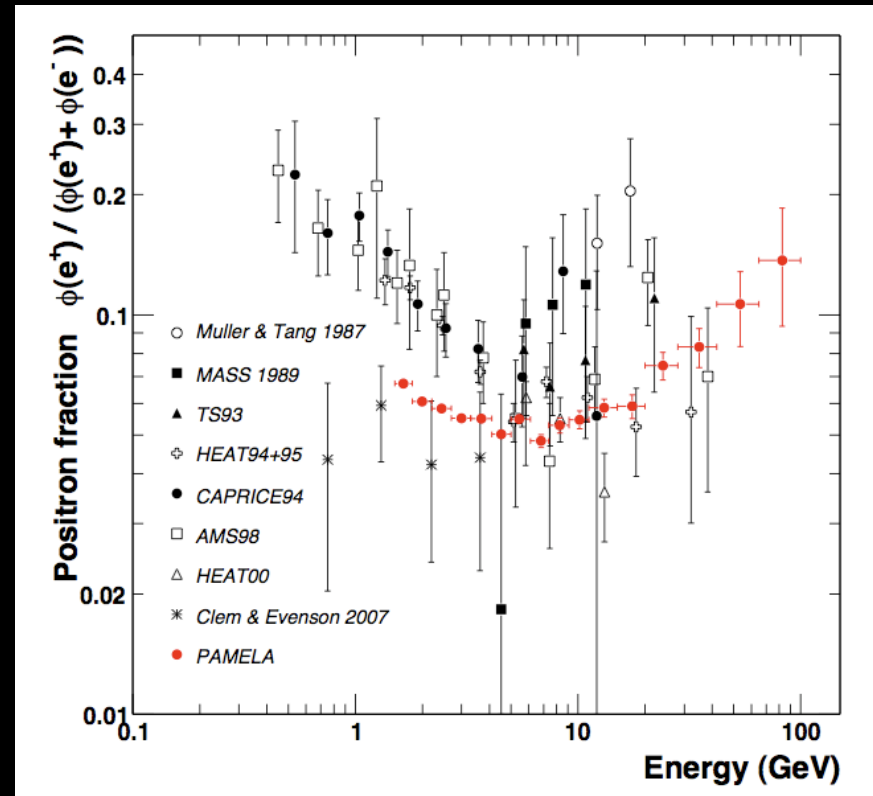
Direct



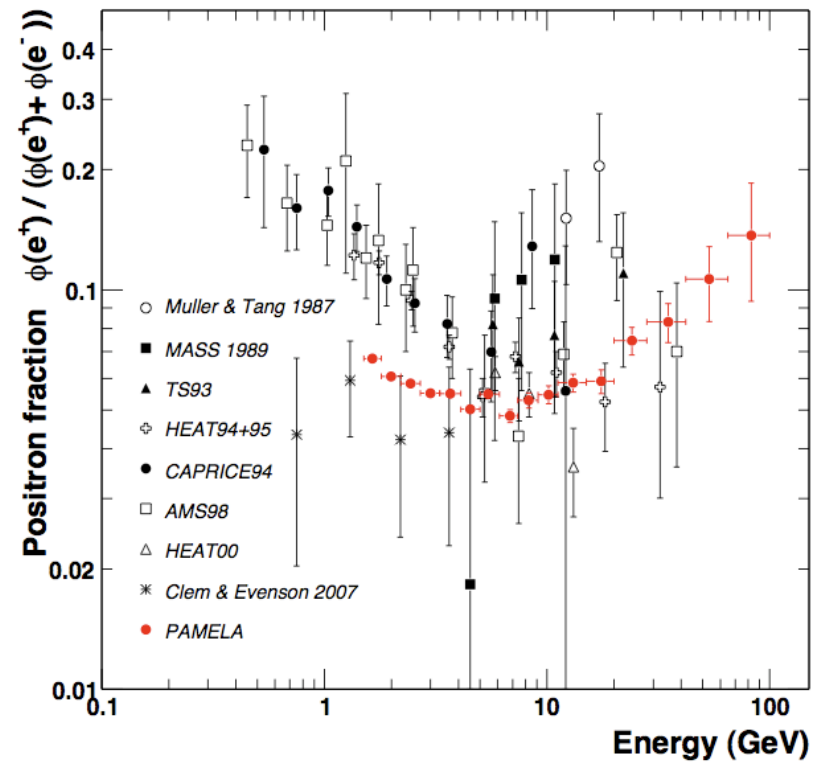
Indirect



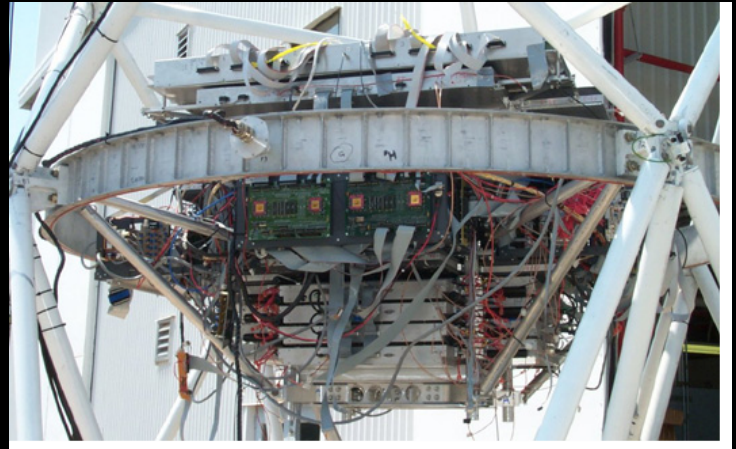
a Payload for Antimatter Matter Exploration and Light-nuclei Astrophysics



PAMELA



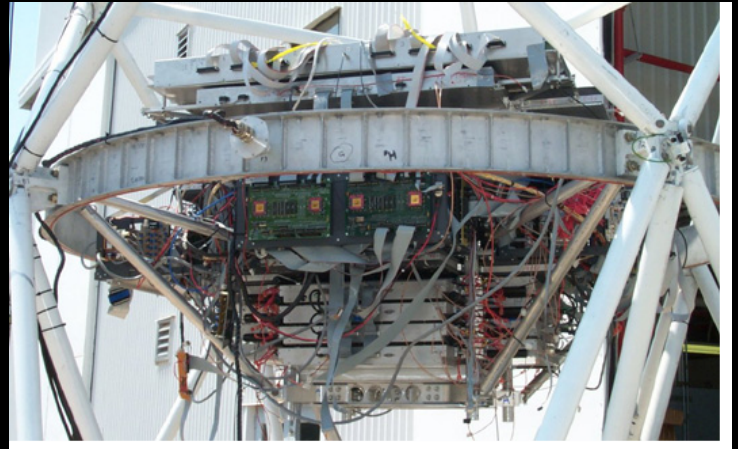
Advanced Thin
Ionization
Calorimeter



Fermi Gamma-
Ray Space
Telescope



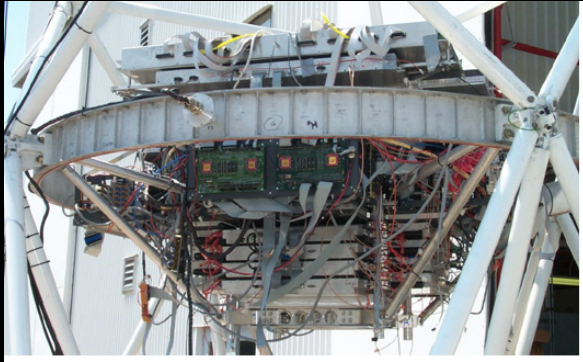
ATIC



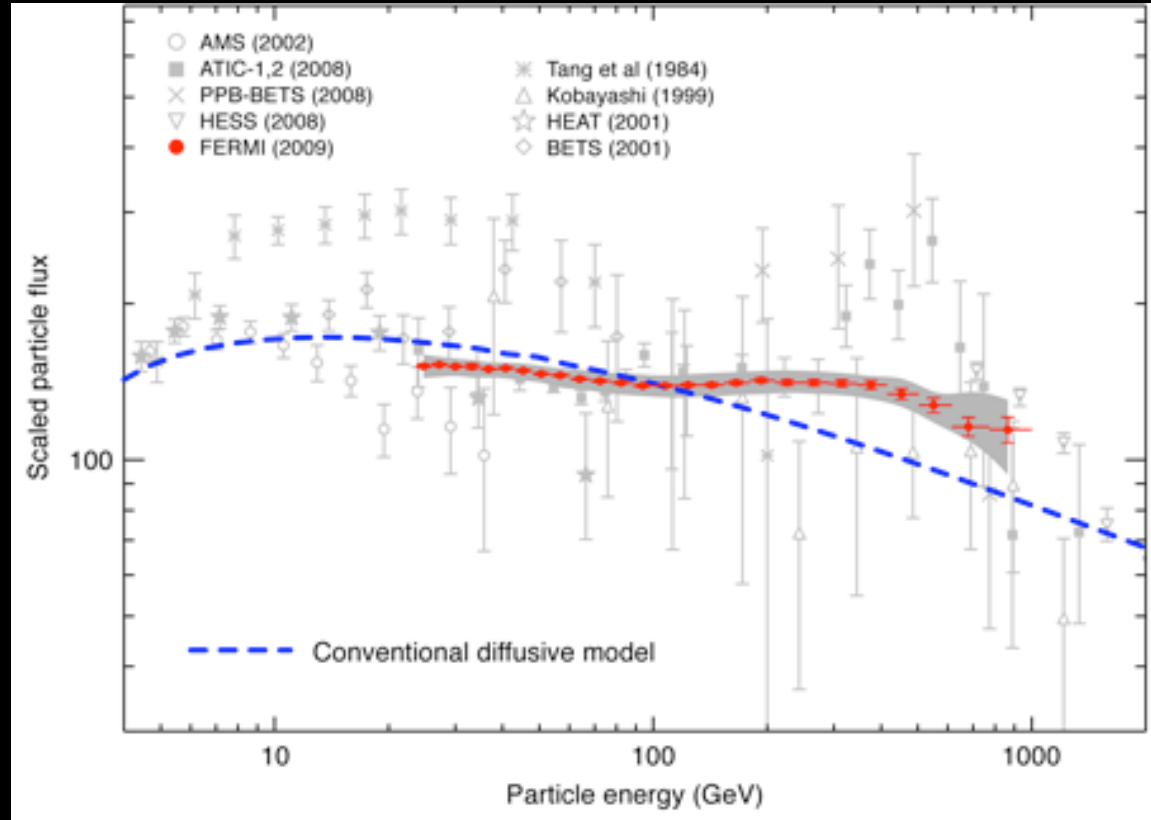
Fermi



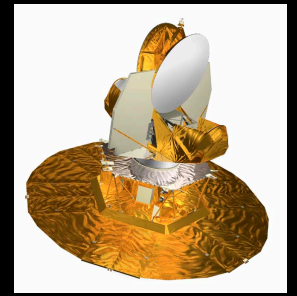
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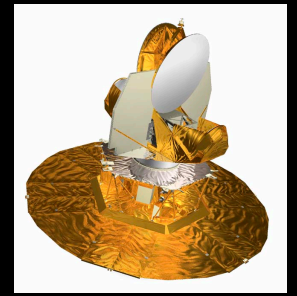
Fermi



Wilkinson Microwave Anisotropy Probe



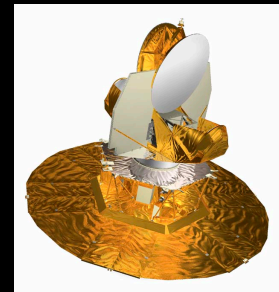
WMAP



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

...but also observes the Milky Way

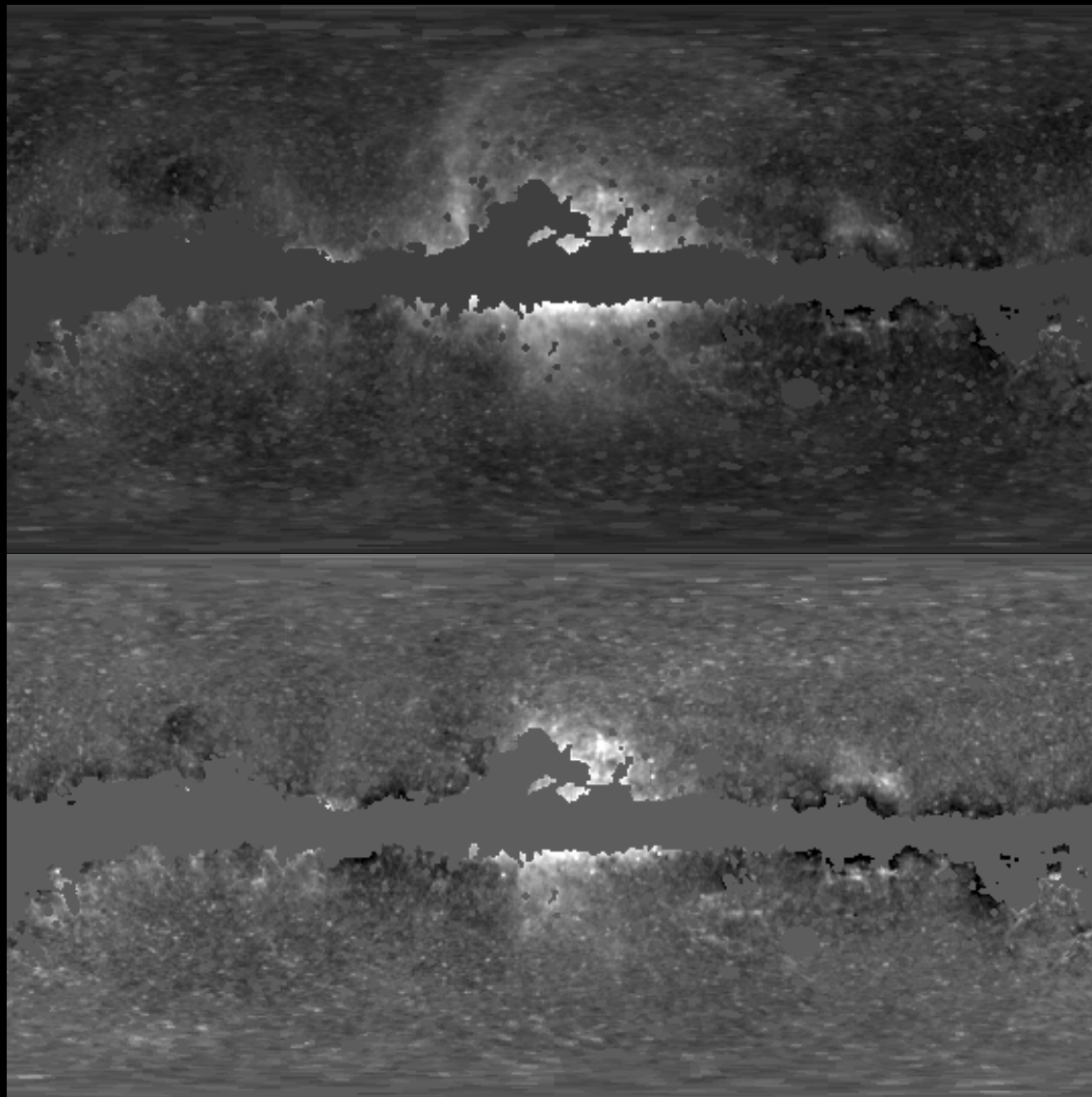
WMAP



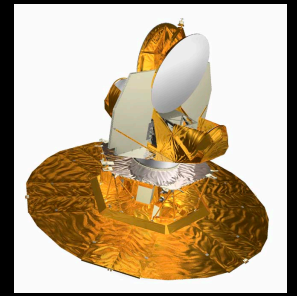
total synchrotron

microwave "haze"

Dobler & Finkbeiner (2008)



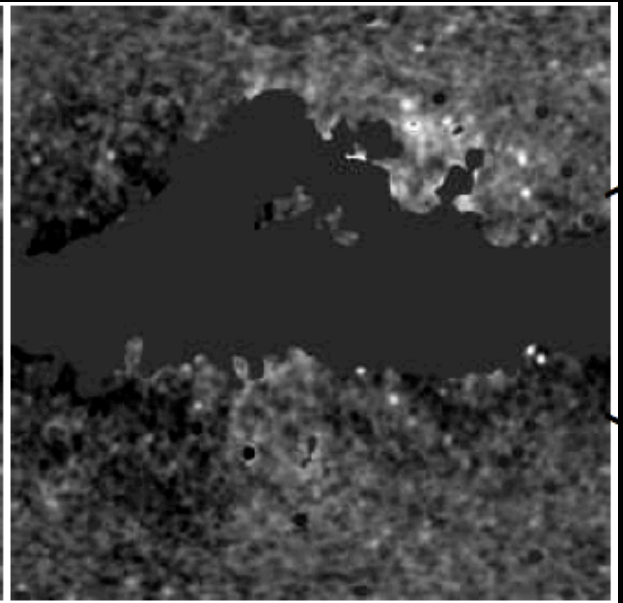
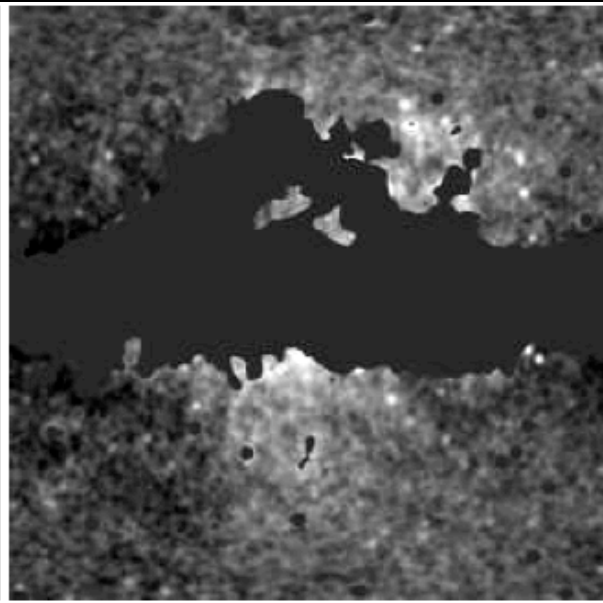
WMAP



Model

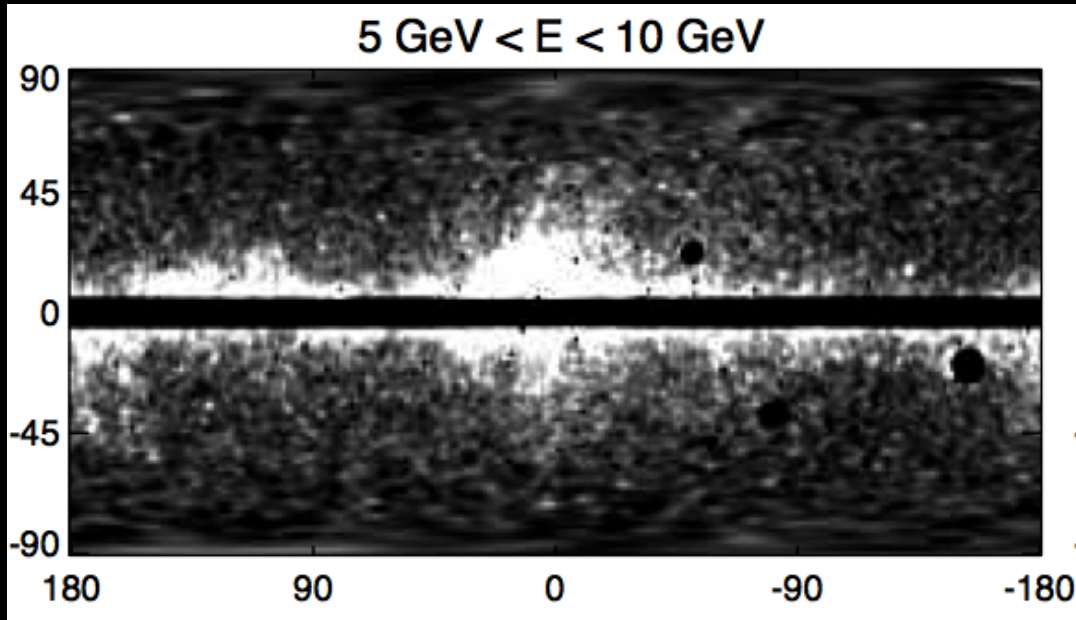
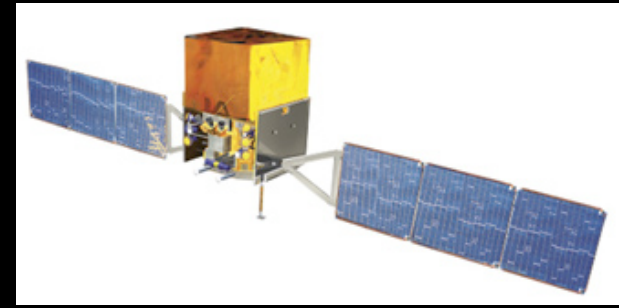
Data

Data - Model

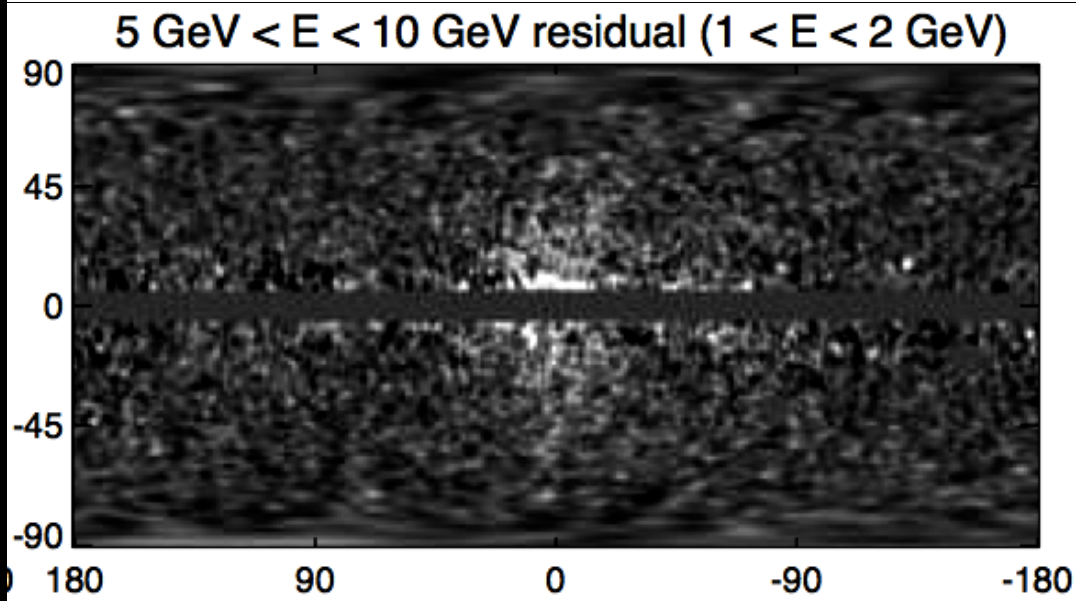


Finkbeiner (2004)

Fermi

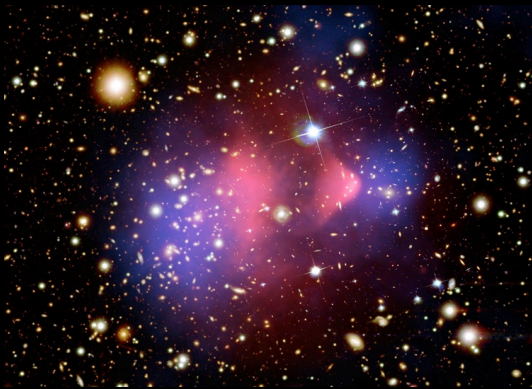
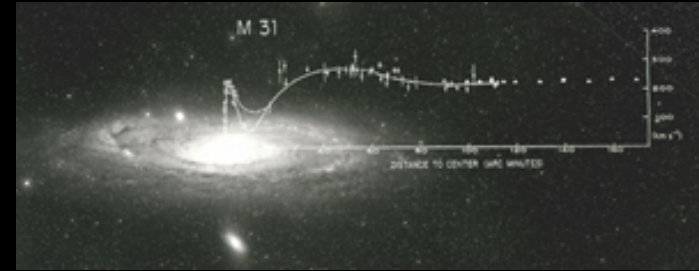
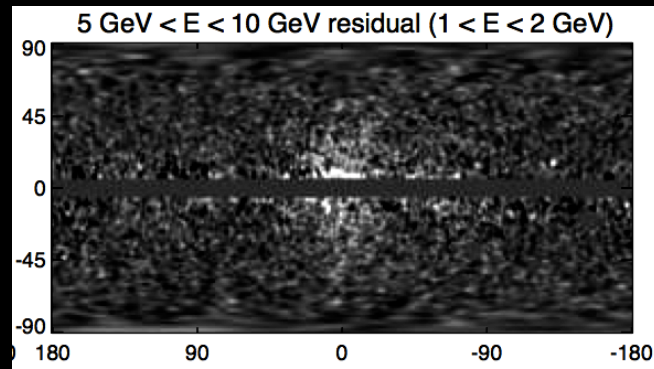
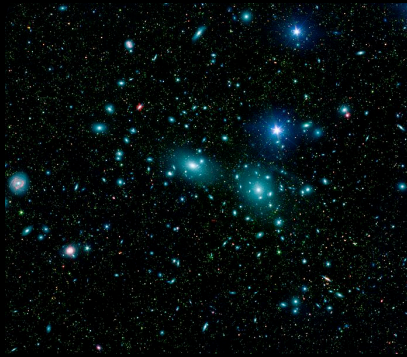


total gamma-rays



gamma-ray "haze"

Dobler et al (2009)



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