



Programma per Giovani Ricercatori  
"Rita Levi Montalcini"



# CROSS-CORRELATIONS OF LARGE-SCALE STRUCTURE SURVEYS AND $\epsilon$ -ASTROGAM

*Stefano Camera*

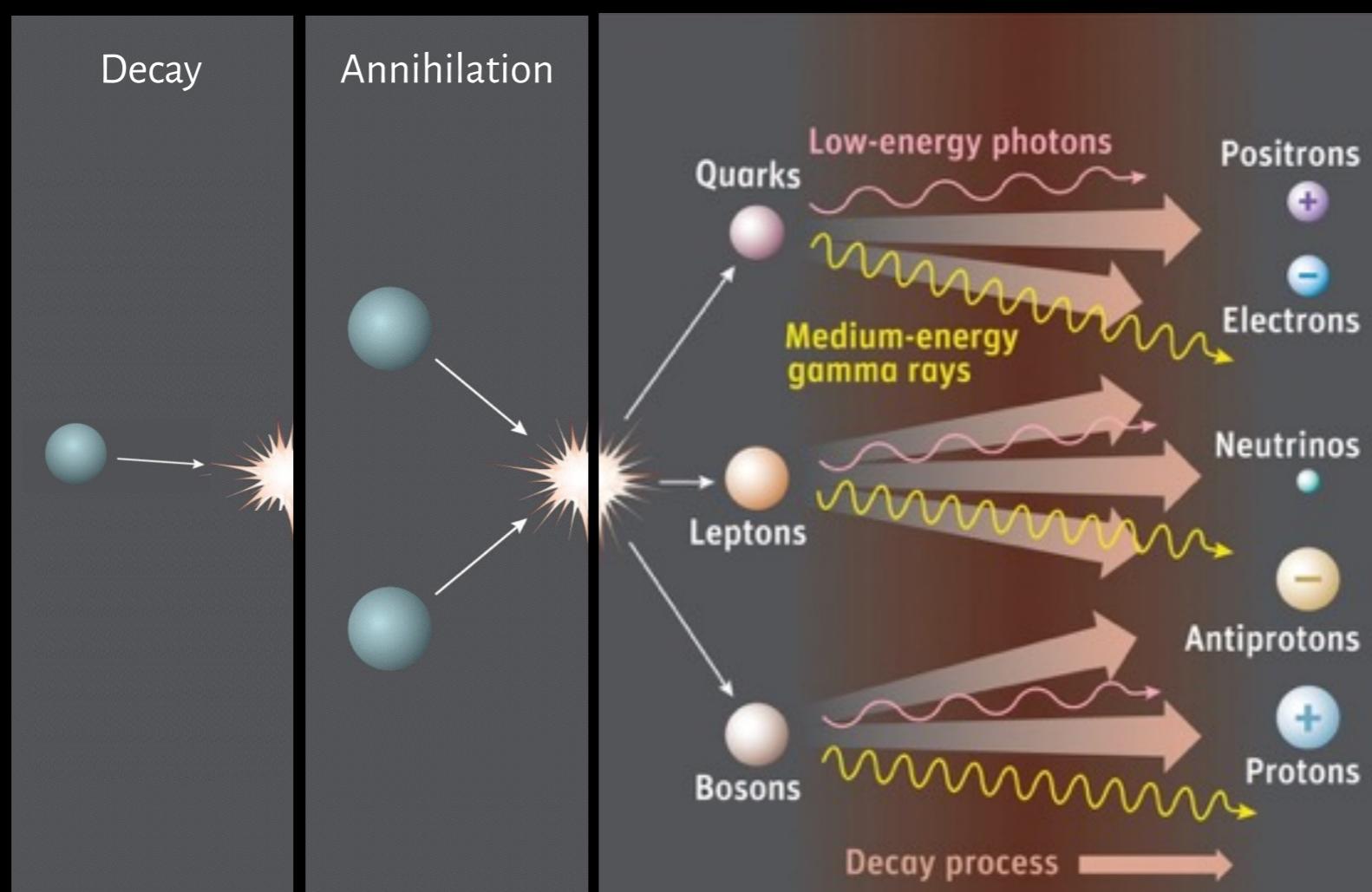
*w/ Nicola Fornengo & Marco Regis*

Dipartimento di Fisica, Università degli Studi di Torino, Italy



# PARTICLE DARK MATTER

- Particle dark matter established ingredient of concordance cosmology
- Indirect detection experiments: DM-sourced cosmic & gamma rays

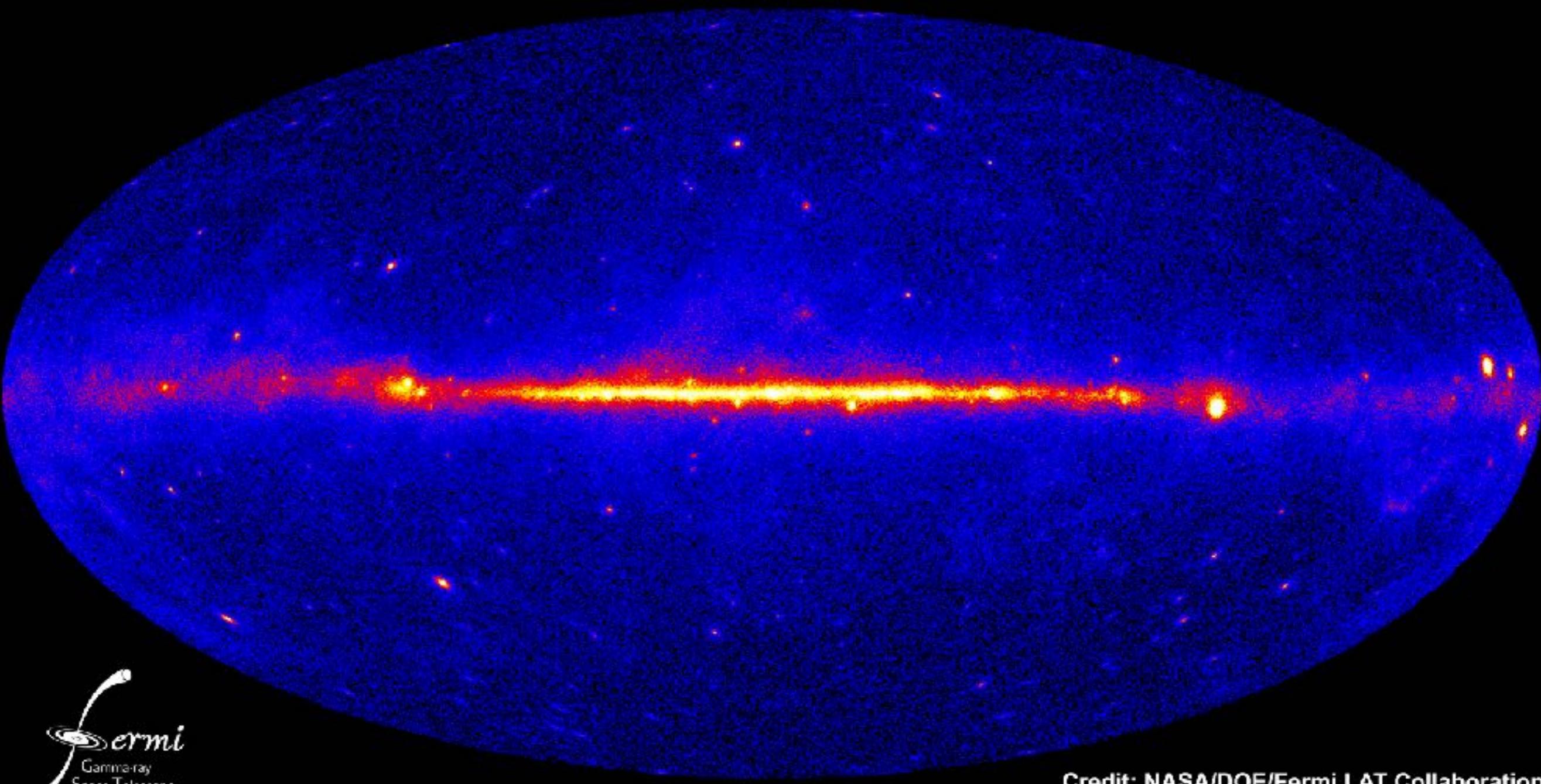


# PARTICLE DARK MATTER

- Particle dark matter established ingredient of concordance cosmology
- Indirect detection experiments: DM-sourced cosmic & gamma rays
  - Weakly interacting massive particles (WIMPs)
- Other interesting MeV DM candidates with e-ASTROGAM!
  - Self-interacting DM
  - ‘Cannibal’ DM
  - Strong-interacting DM
  - Axion-like particles

# DM-SOURCED GAMMA RAYS

NASA's Fermi telescope reveals best-ever view of the gamma-ray sky

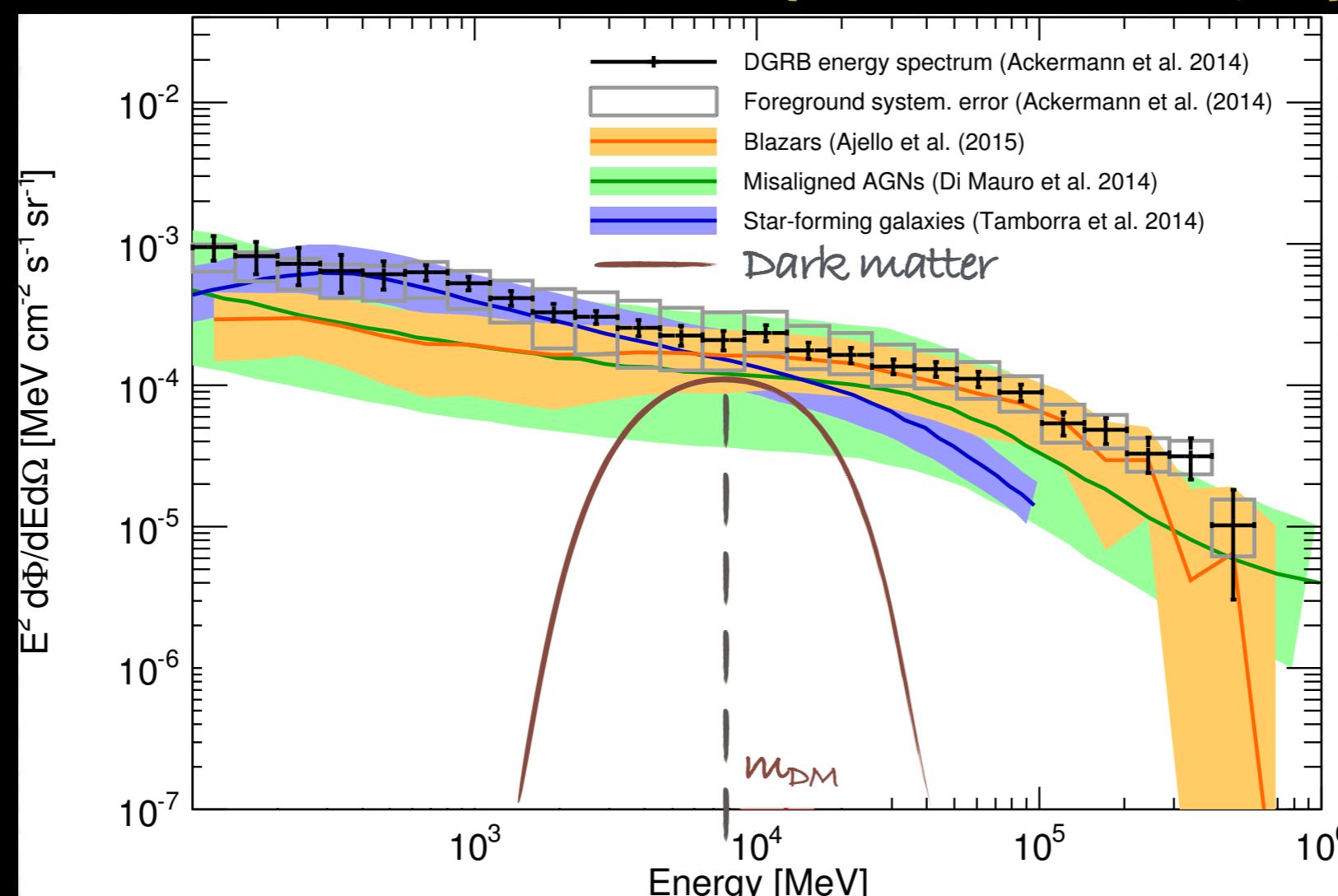


Credit: NASA/DOE/Fermi LAT Collaboration

# DM-SOURCEDED GAMMA RAYS

- Hunting down signal of annihilations/decays of dark matter particles
  - Gamma-ray energy spectrum

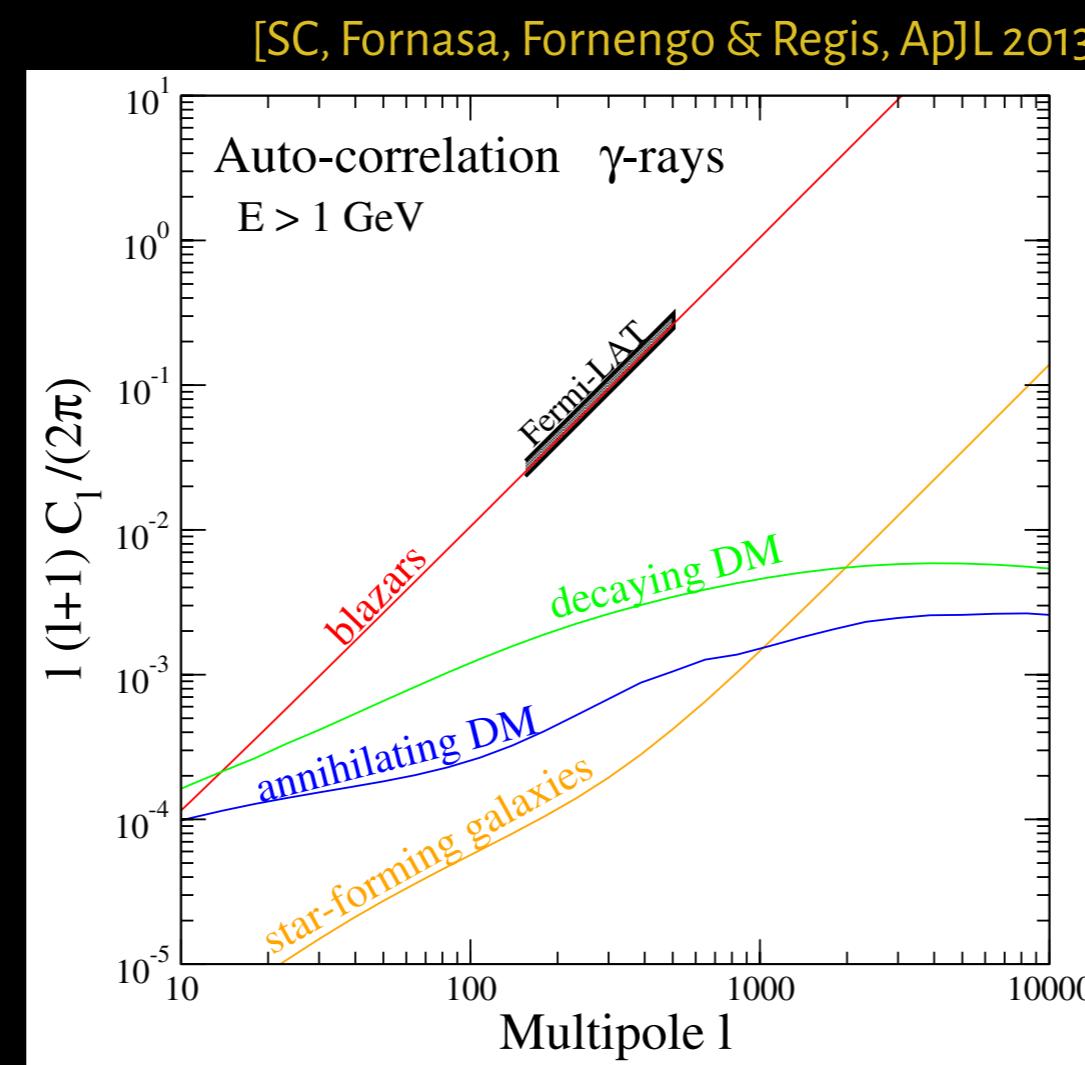
[Fornasa & Sánchez-Conde, 2015]





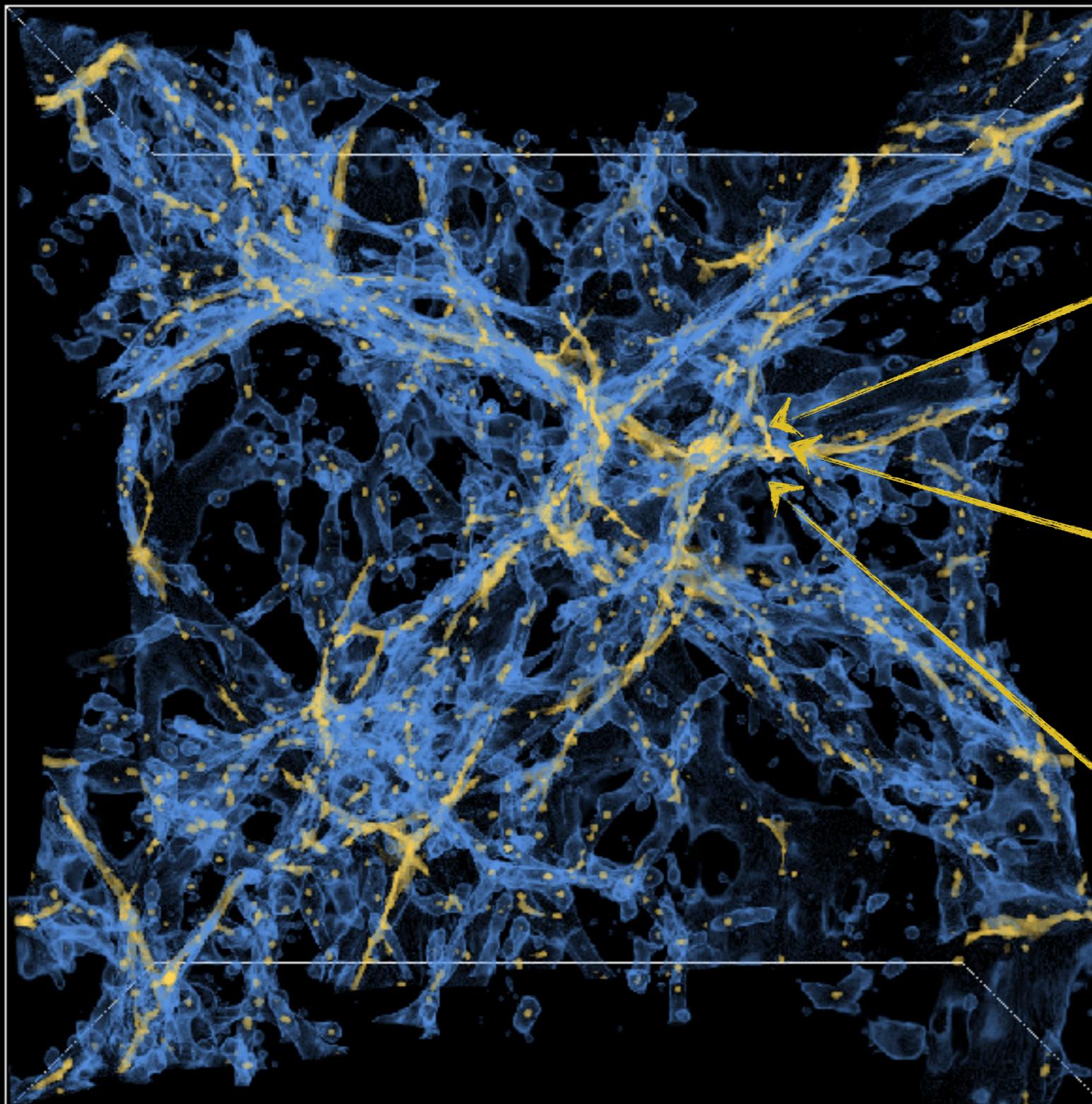
# DM-SOURCED GAMMA RAYS

- Hunting down signal of annihilations/decays of dark matter particles
  - Gamma-ray anisotropies angular spectrum



# DIRECT GRAVITATIONAL PROBES

[Lukic et al.; Image: Casey Stark]



Potential wells of the cosmic large-scale structure

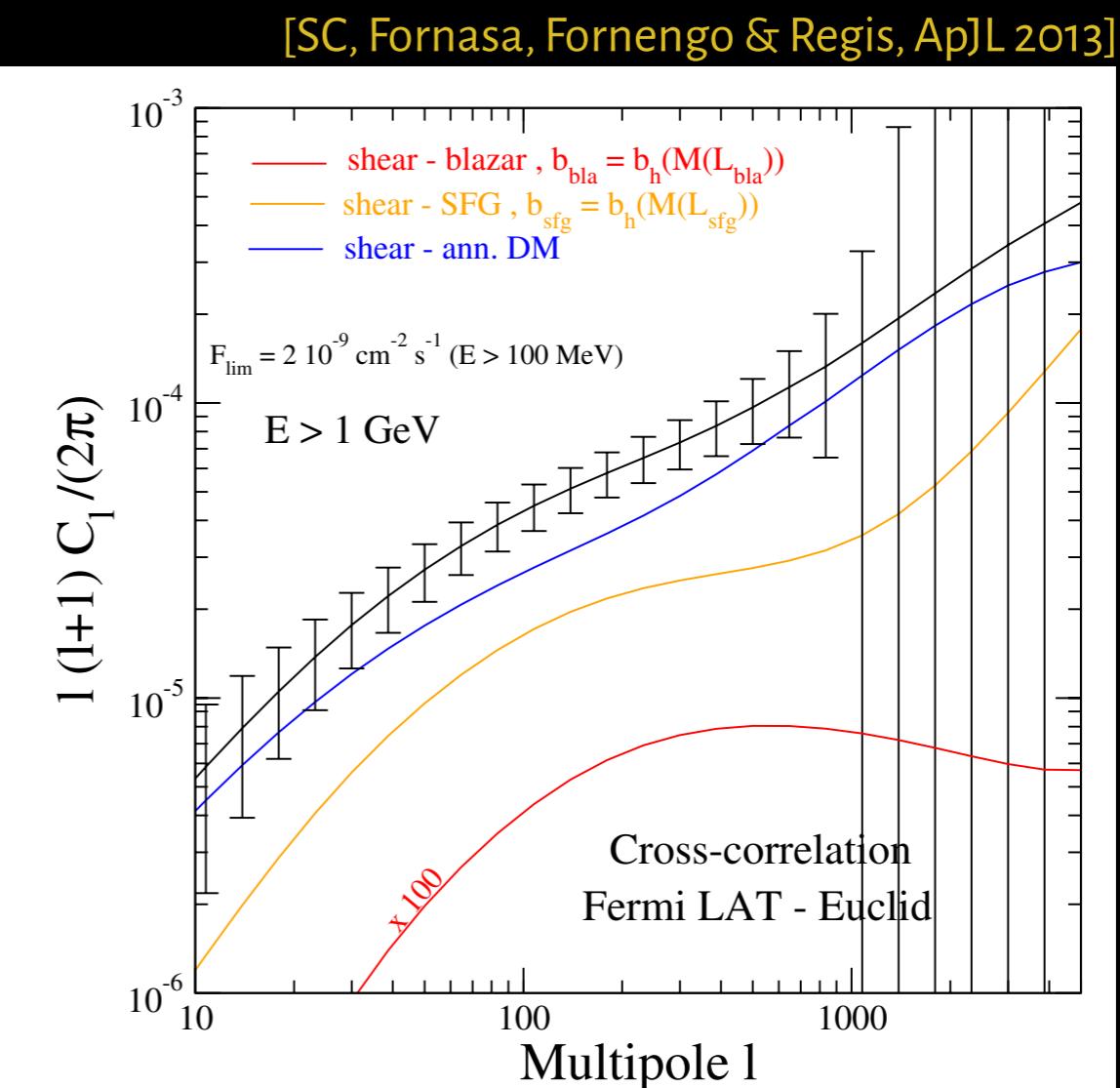
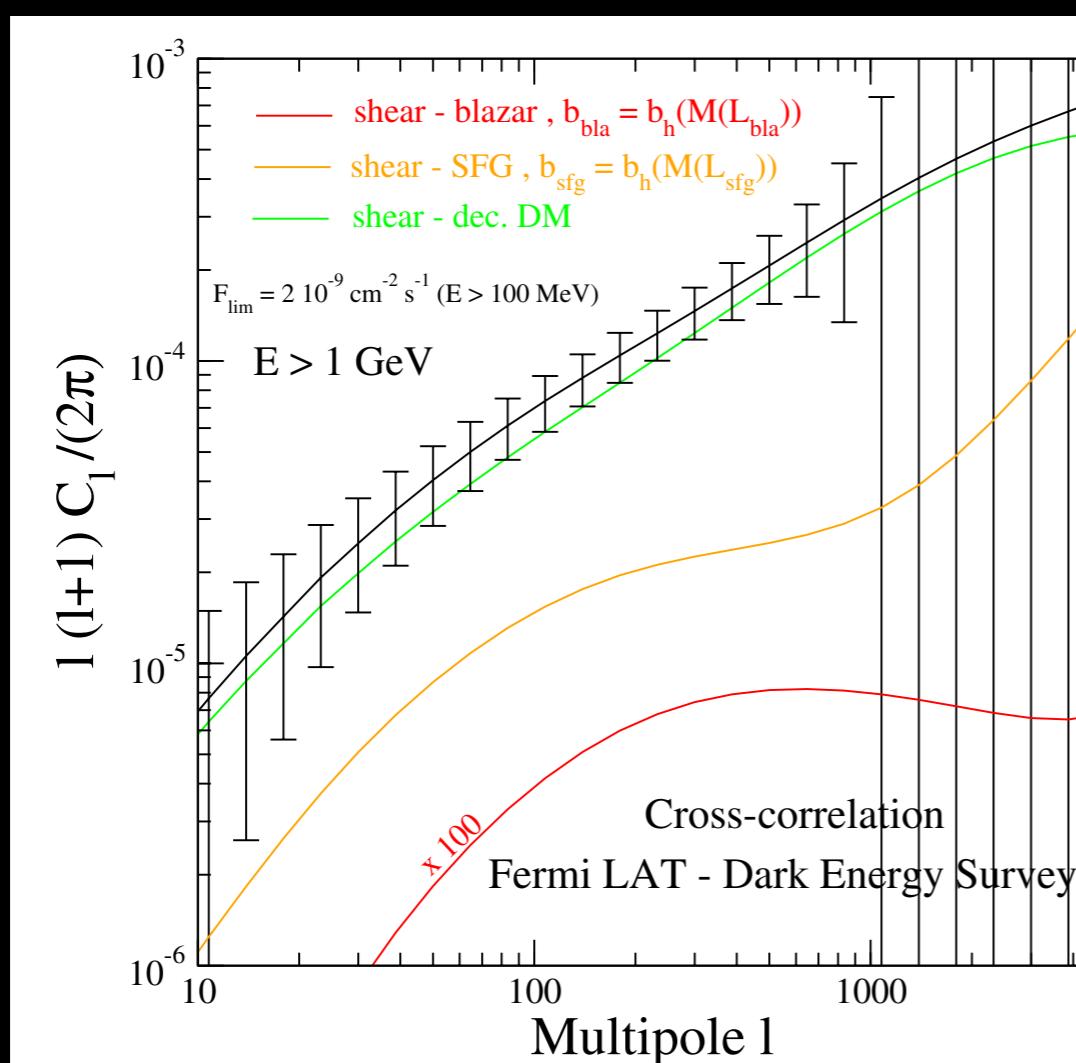
Gamma rays from astrophysical sources hosted within the dark matter halo

Gamma rays from annihilations/decays of dark matter particles forming the halo

# DIRECT GRAVITATIONAL PROBES

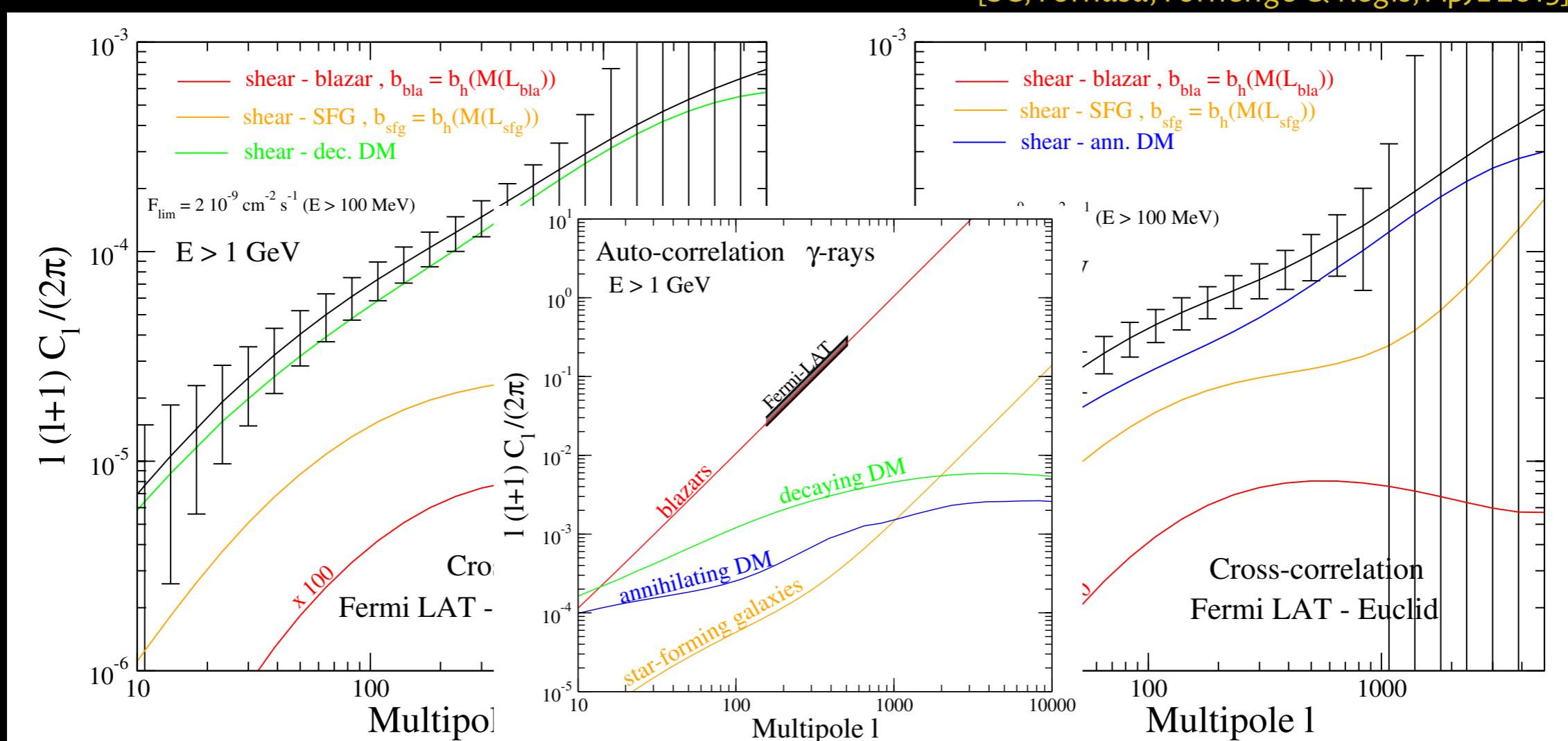
- Find an optimal tracer of the cosmic dark matter distribution on large scale to filter out astrophysical non-thermal emission from the dark matter gamma-ray signal
- Main tracers of the cosmic large-scale structure:
  - Weak gravitational lensing (cosmic shear, CMB lensing...)  
[SC, Fornasa, Fornengo & Regis, ApJL 2013;  
Fornengo, Perotto, Regis & SC, ApJL 2015; Shirasaki et al. 2013; 2015]
  - Clustering of structures (galaxies, galaxy clusters...)  
[Fornengo & Regis, 2014; Ando et al., 2014; Xia et al., ApJS 2015;  
Regis et al., PRL 2015; Shirasaki et al., 2015, Branchini, SC et al., ApJS 2017]

# GAMMA RAYS & COSMIC SHEAR





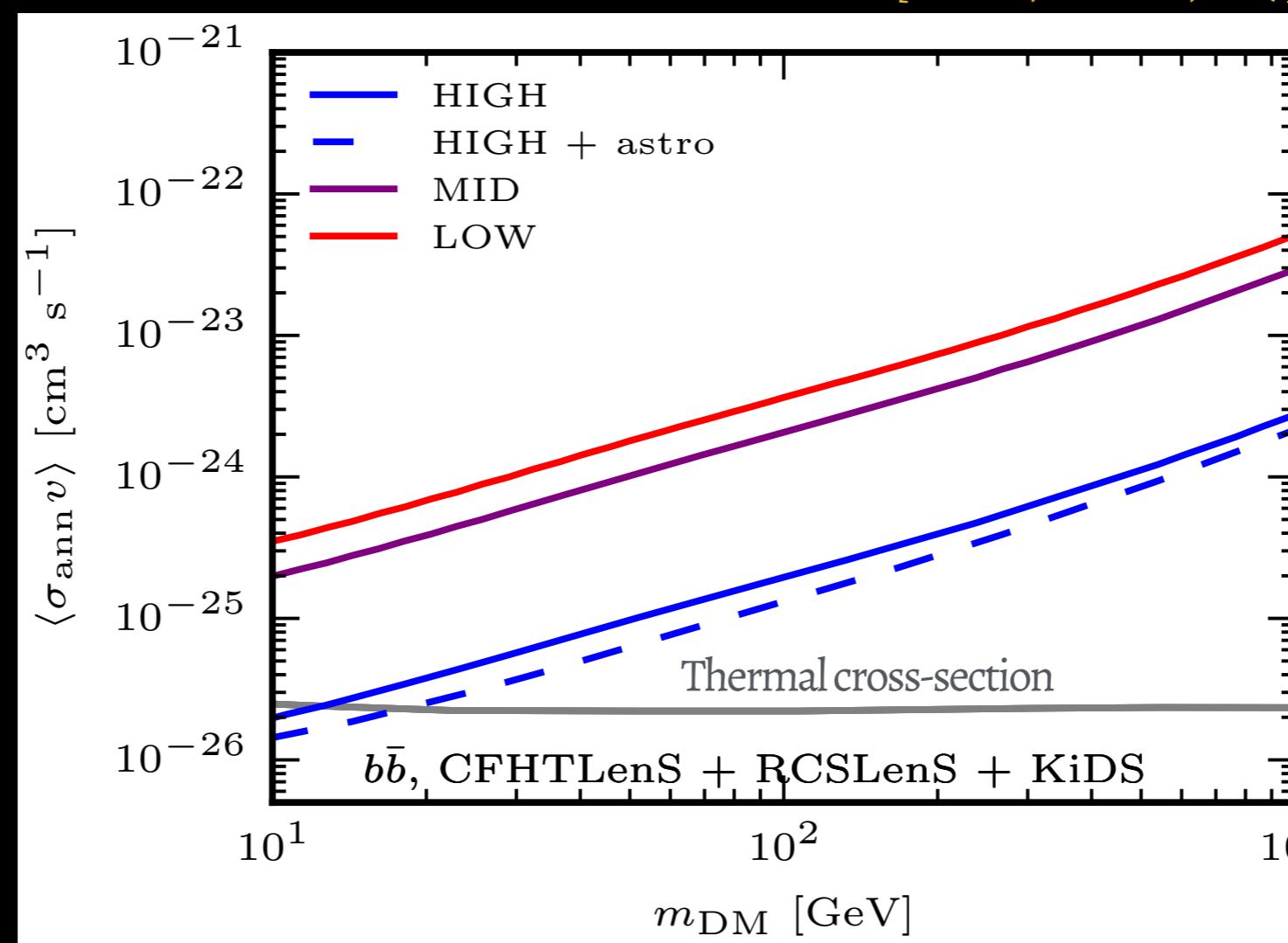
# GAMMA RAYS & COSMIC SHEAR



# GAMMA RAYS & COSMIC SHEAR



[Tröster, SC et al., 2017]



# GAMMARAY & SHEAR + CLUSTERING

