

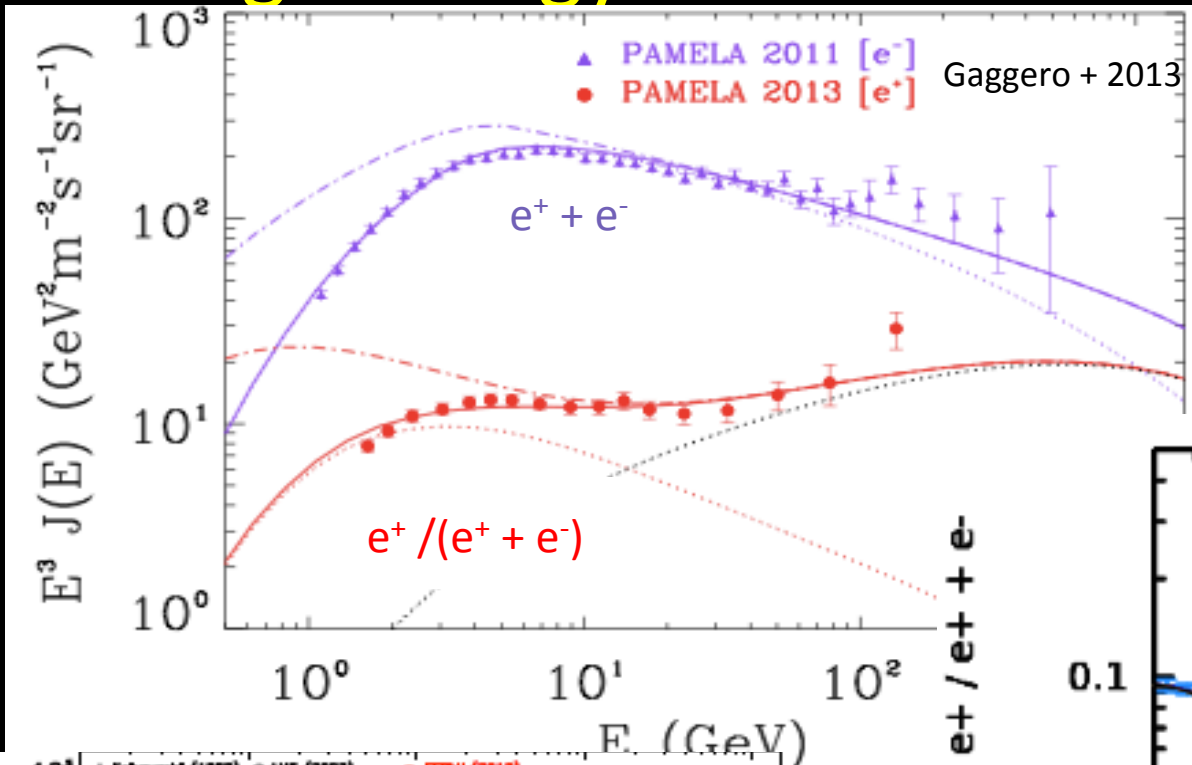
# DETECTION OF DARK MATTER

## some future prospects

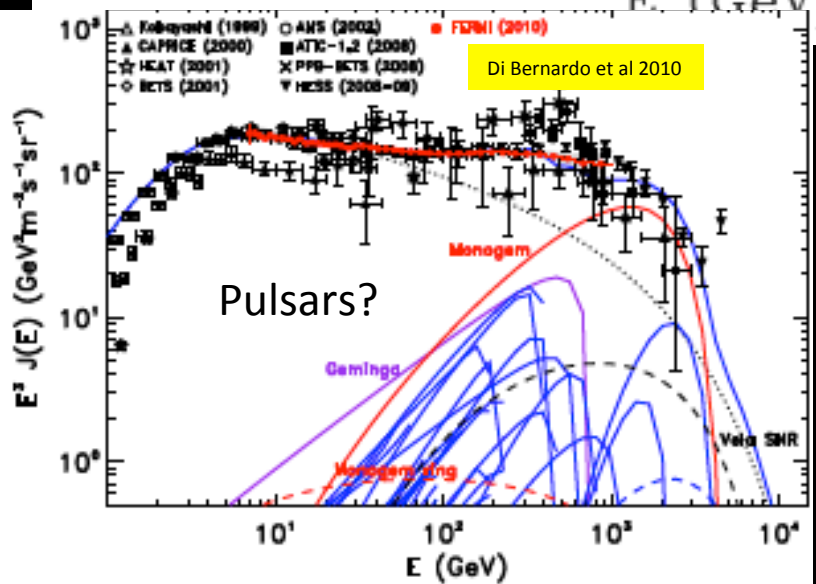
ILP

19 June 2014

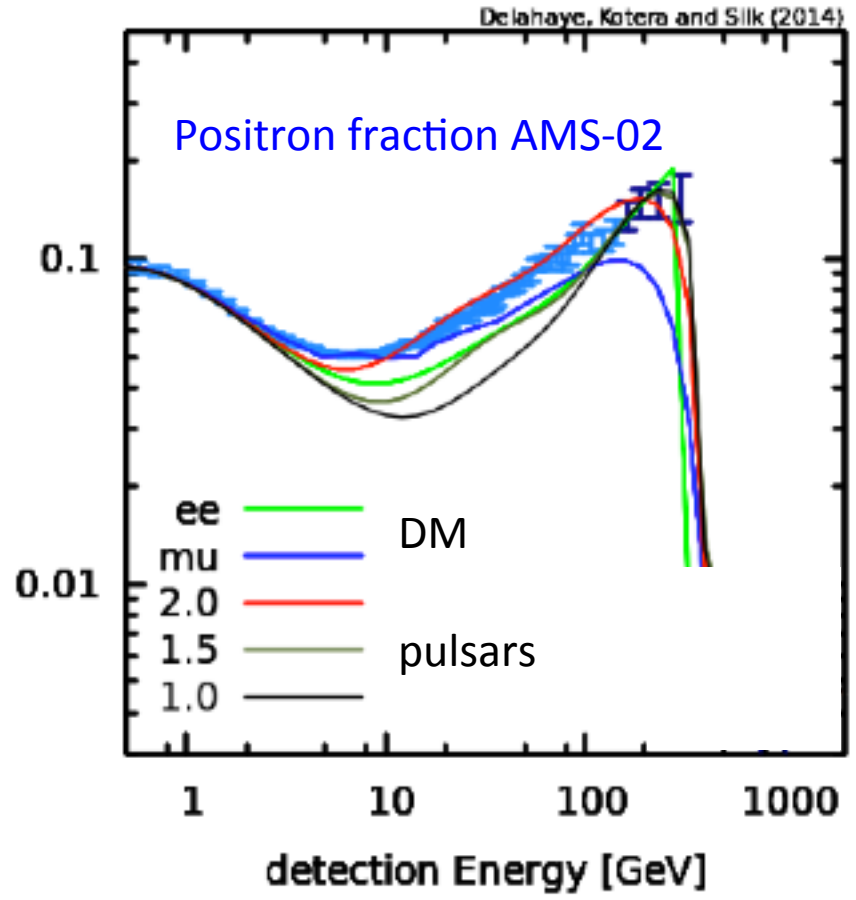
# High energy electrons and positrons



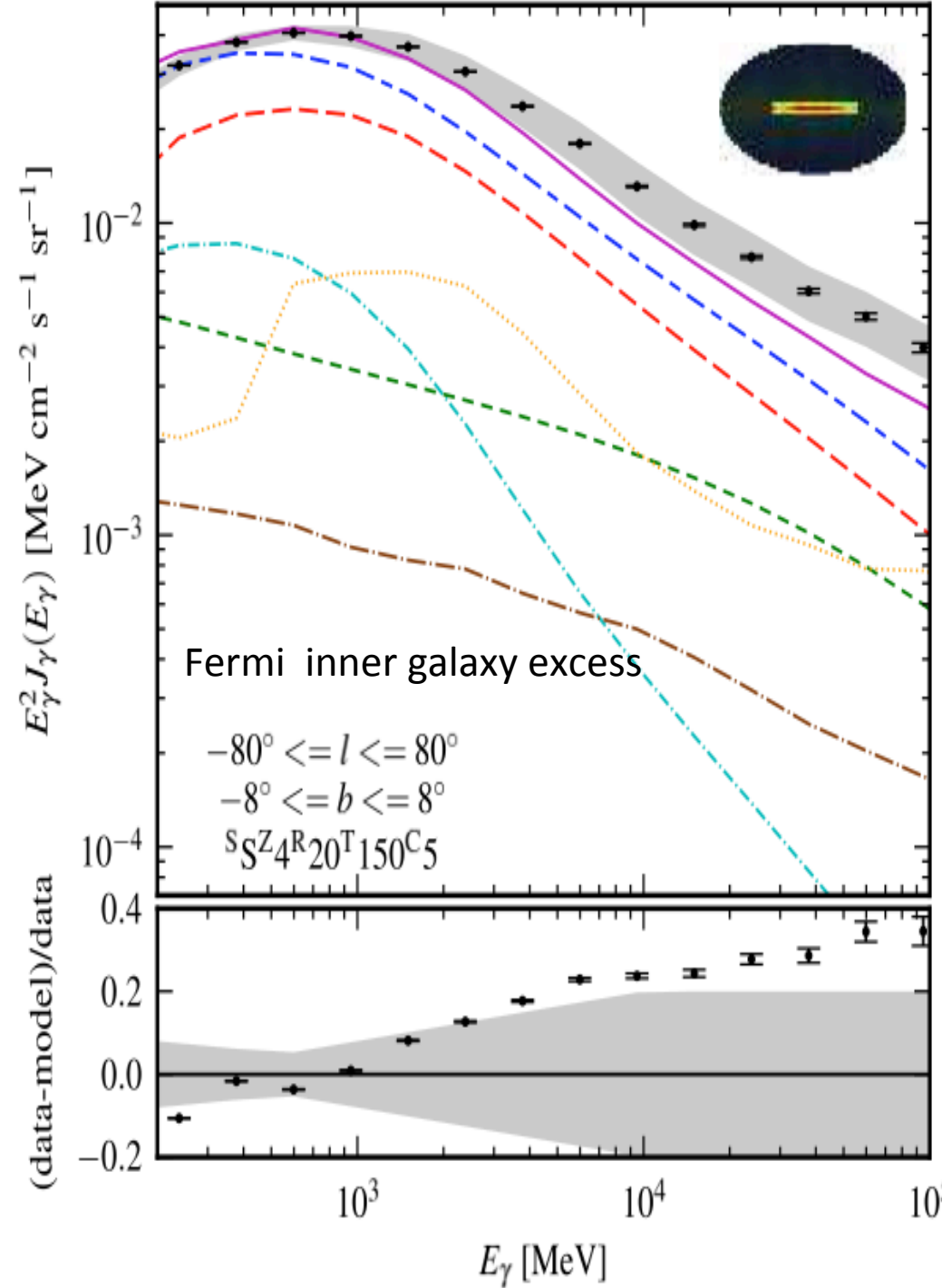
New symmetric TeV component needed



positron fraction :  $e^+ / e^+ + e^-$



Delahaye, Kotera and Silk (2014)

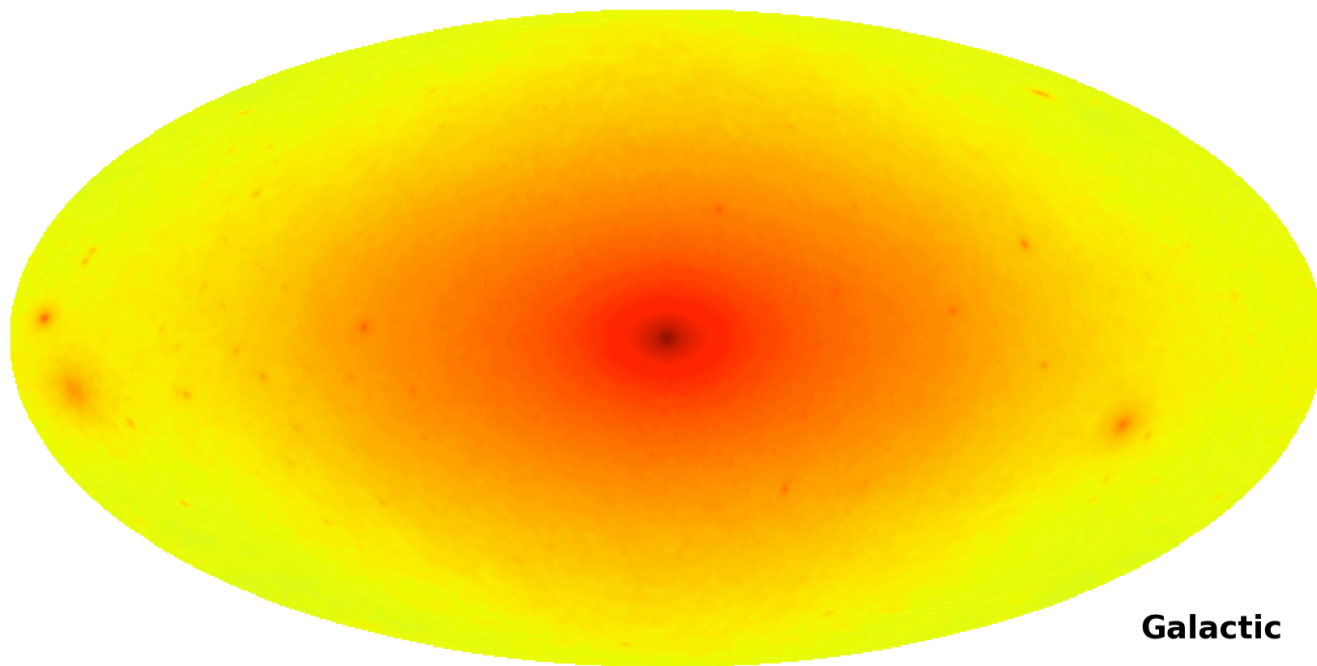


Via Lactea 2 simulation  
(10<sup>9</sup> particles of 4000 M<sub>⊙</sub>)

$z=11.9$   
 800 x 600 physical kpc

Diemand, Kuhlen, Madau 2006

DM Decay Map No Correction



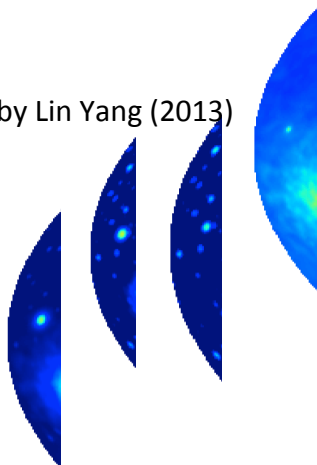
**Galactic**

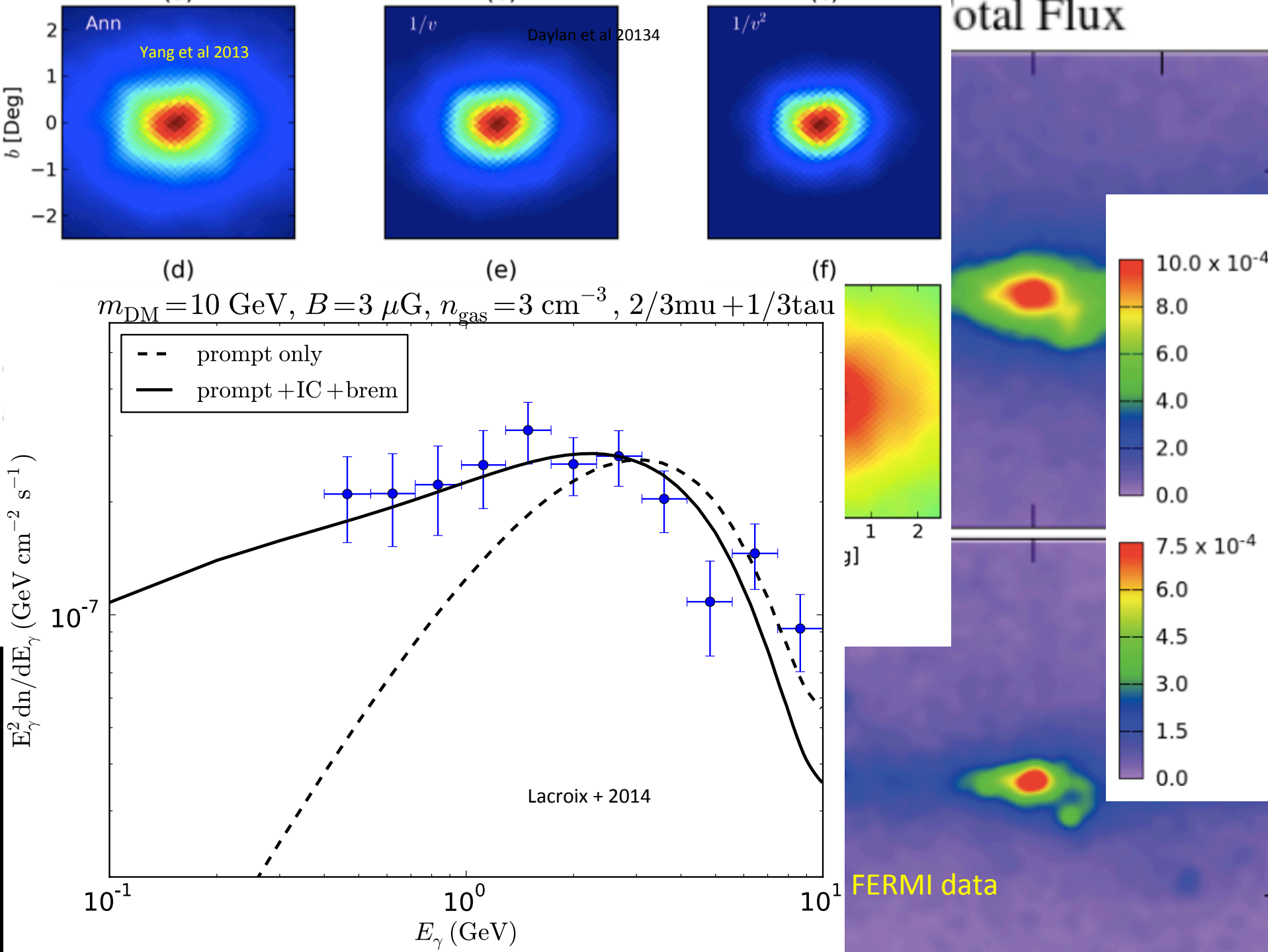


----- normalized flux -----



s by Lin Yang (2013)

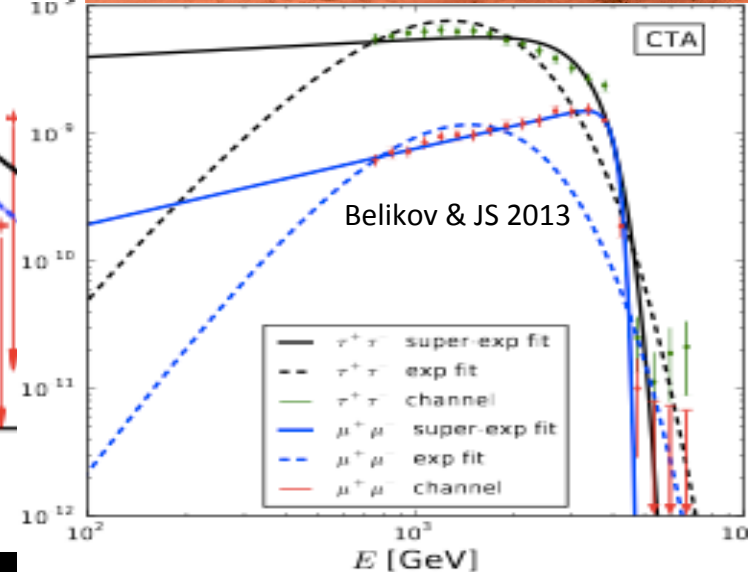
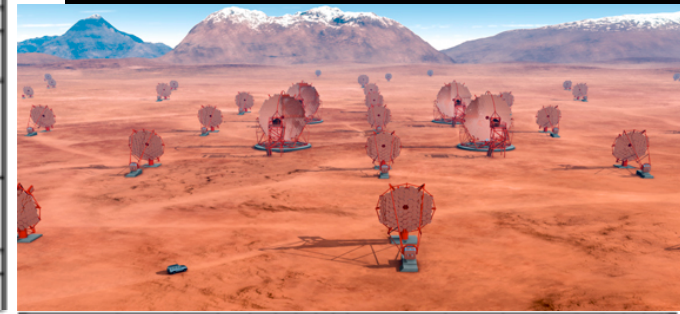
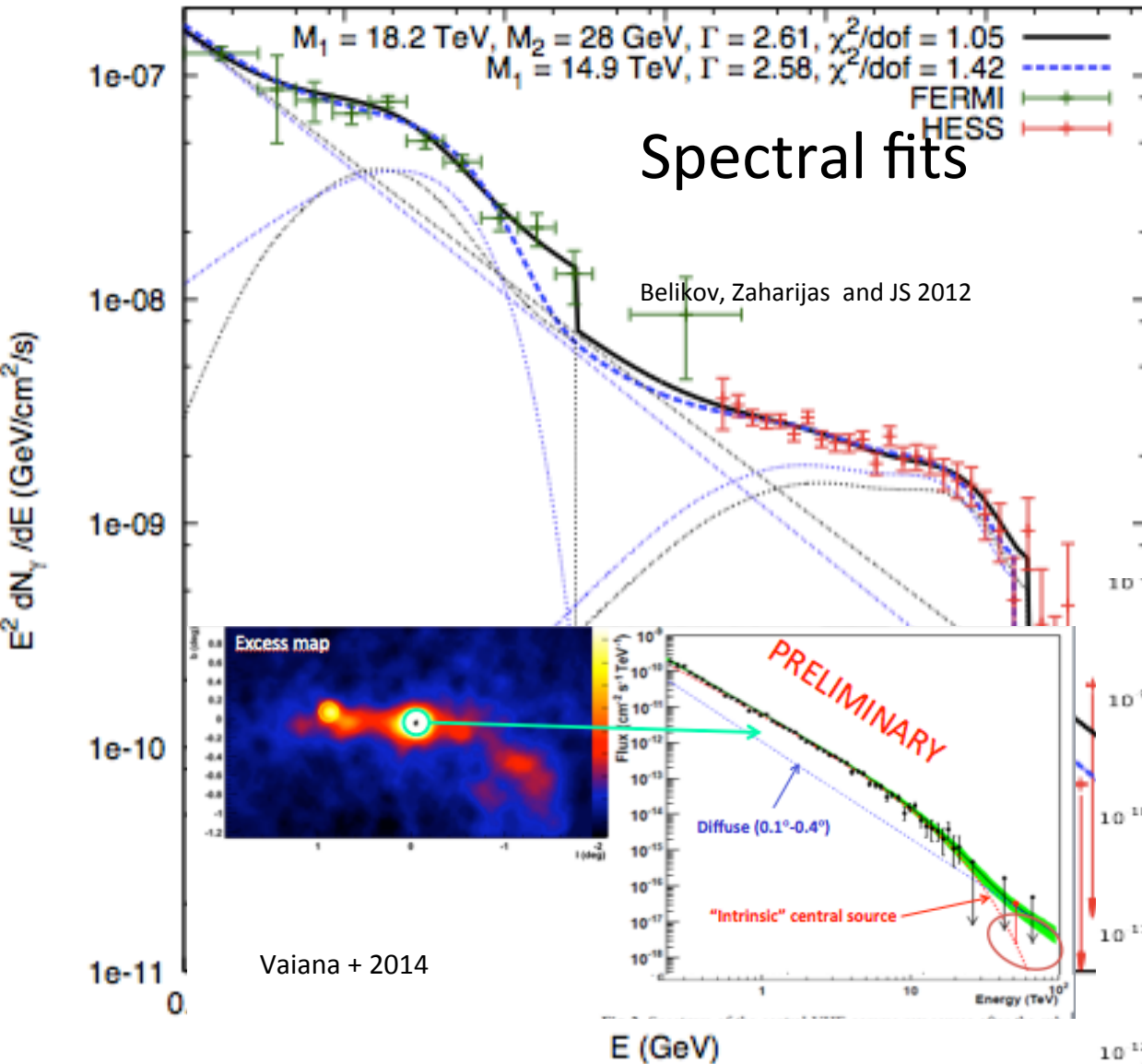




# Galactic Center SagA\*



A prediction for CTA:  
superexponential signature  
of TeV DM annihilations

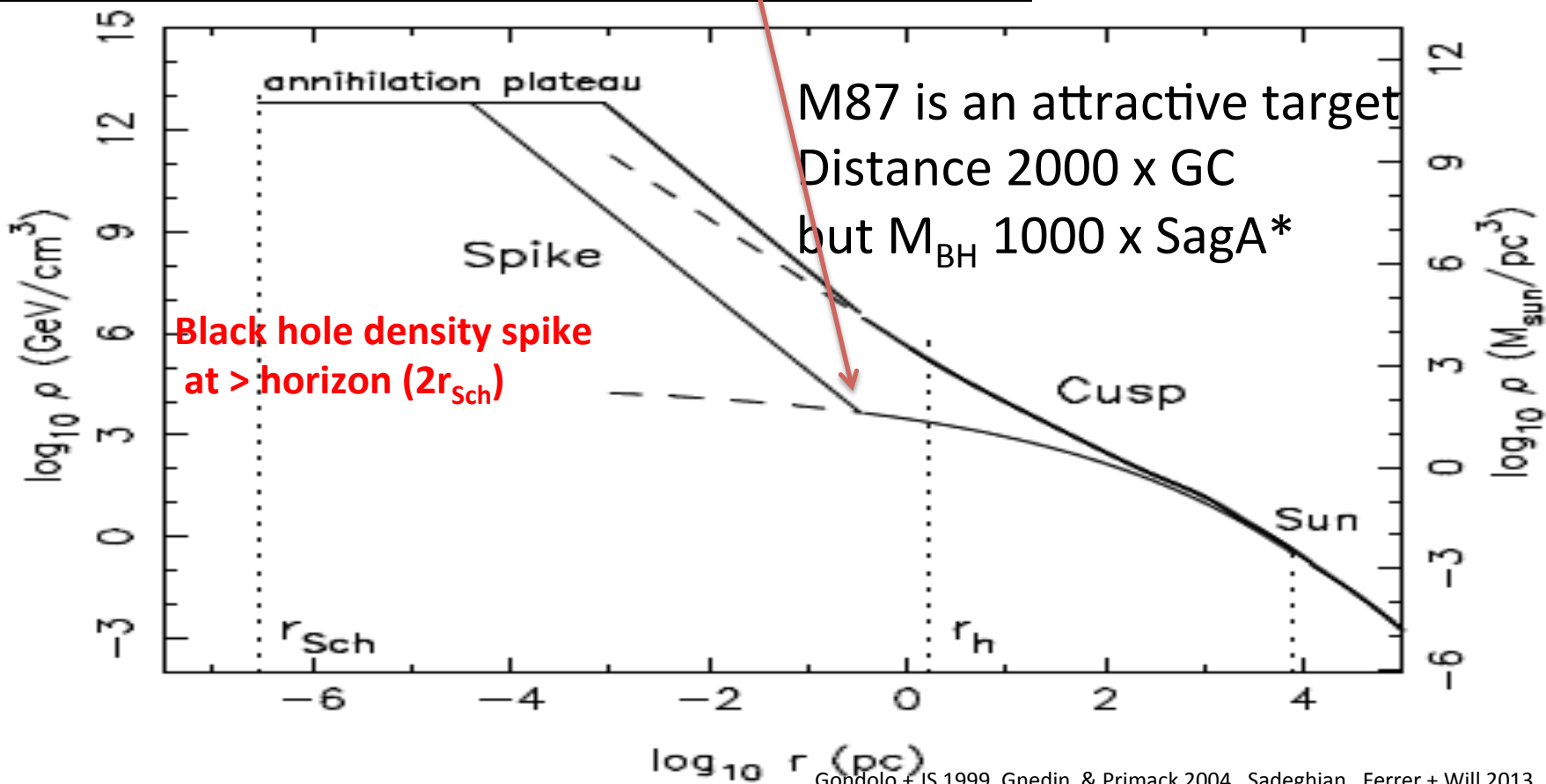
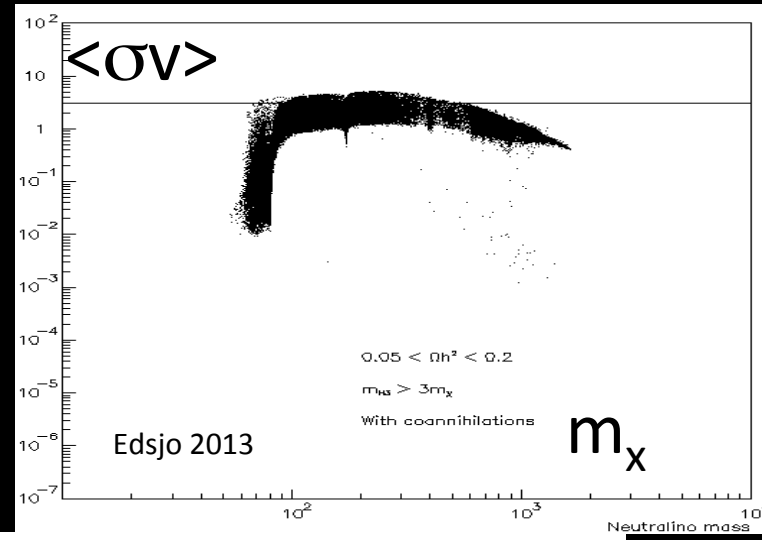


CDM cusp steepens by adiabatic growth of IMBH:  $\rho \propto r^{-\gamma} \Rightarrow \rho \propto r^{-\gamma'}$ , with  $\gamma' = \frac{9-2\gamma}{4-\gamma}$

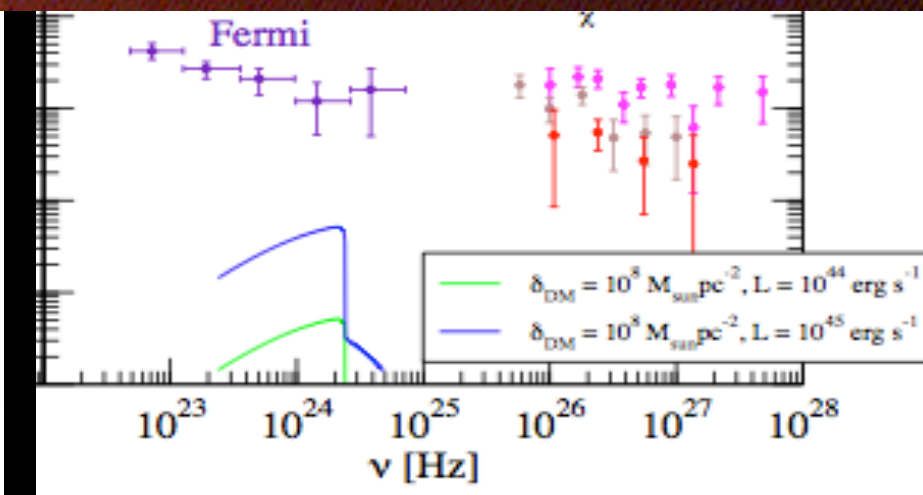
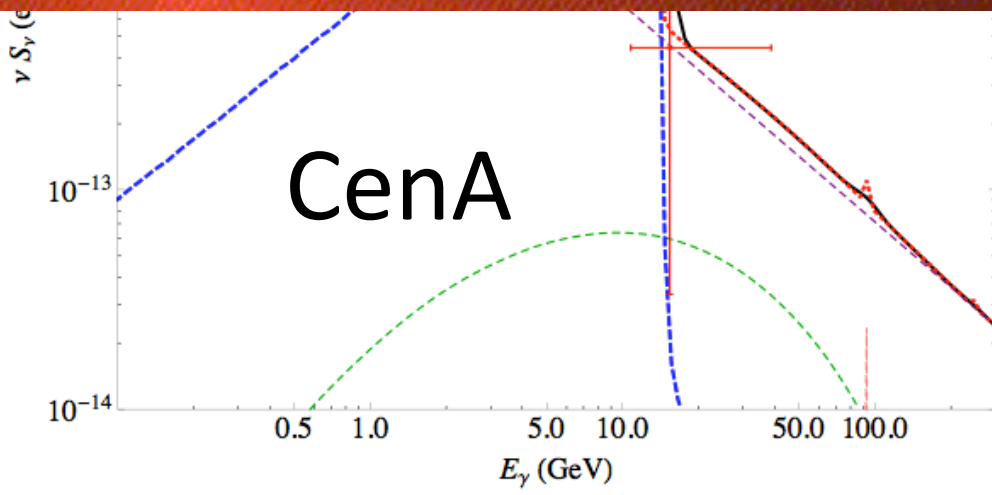
Annihilation rate is amplified within a radius  $GM_{bh}/\sigma^2 \sim 0.003(M_{BH}/10^5 M_\odot)pc$

$$\text{Flux} \sim n_x^2 \langle \sigma v \rangle (2r_g)^3 \sim M_{BH}^3 / \langle \sigma v \rangle$$

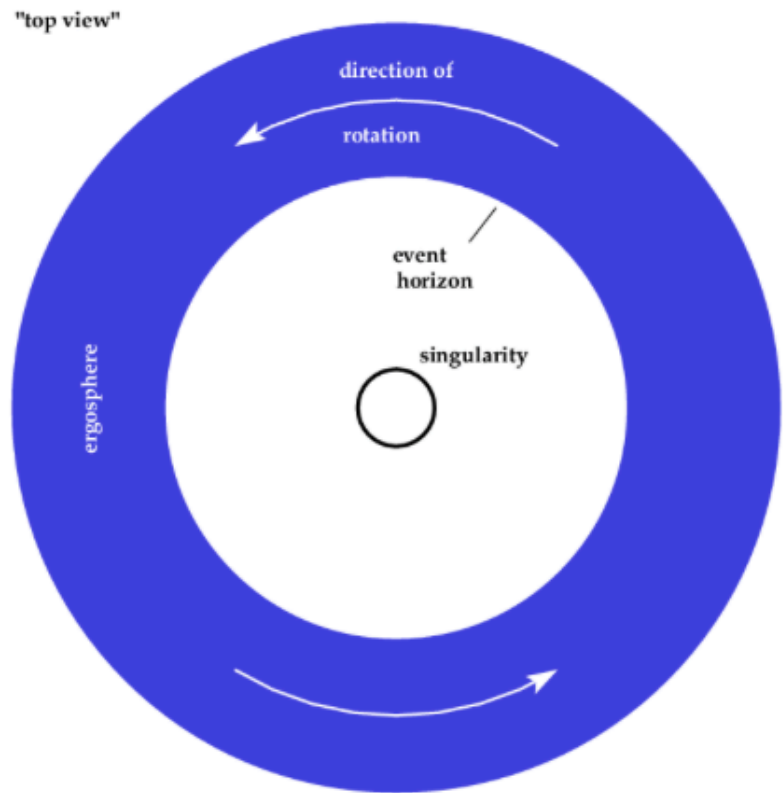
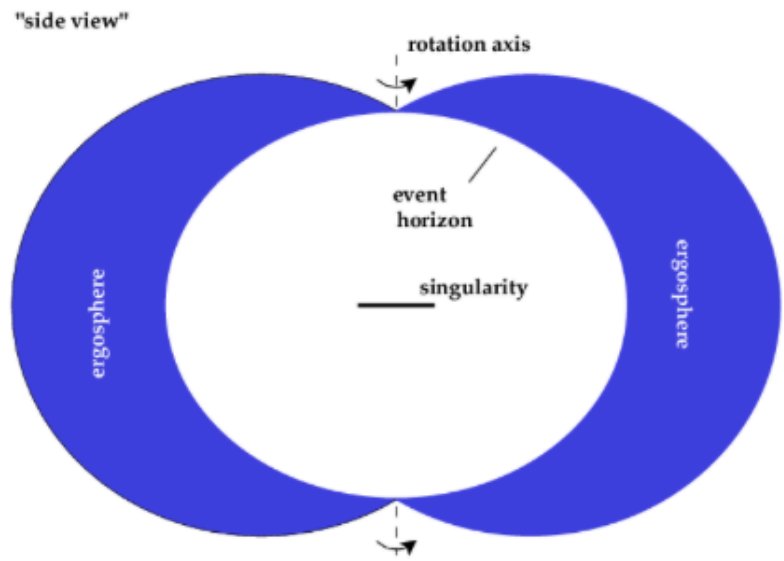
Plateau:  $n_x(r) \langle \sigma v \rangle t_{BH} \sim 1$



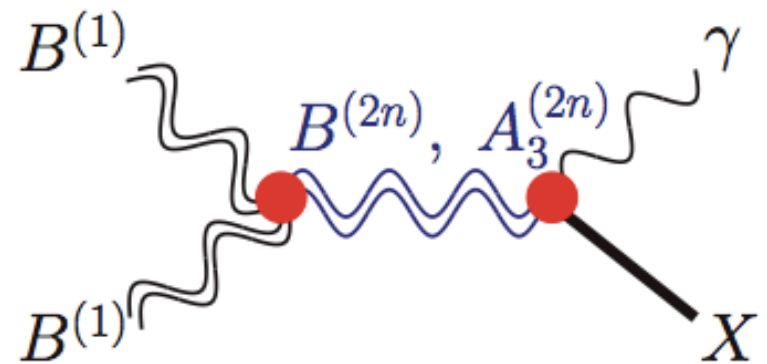
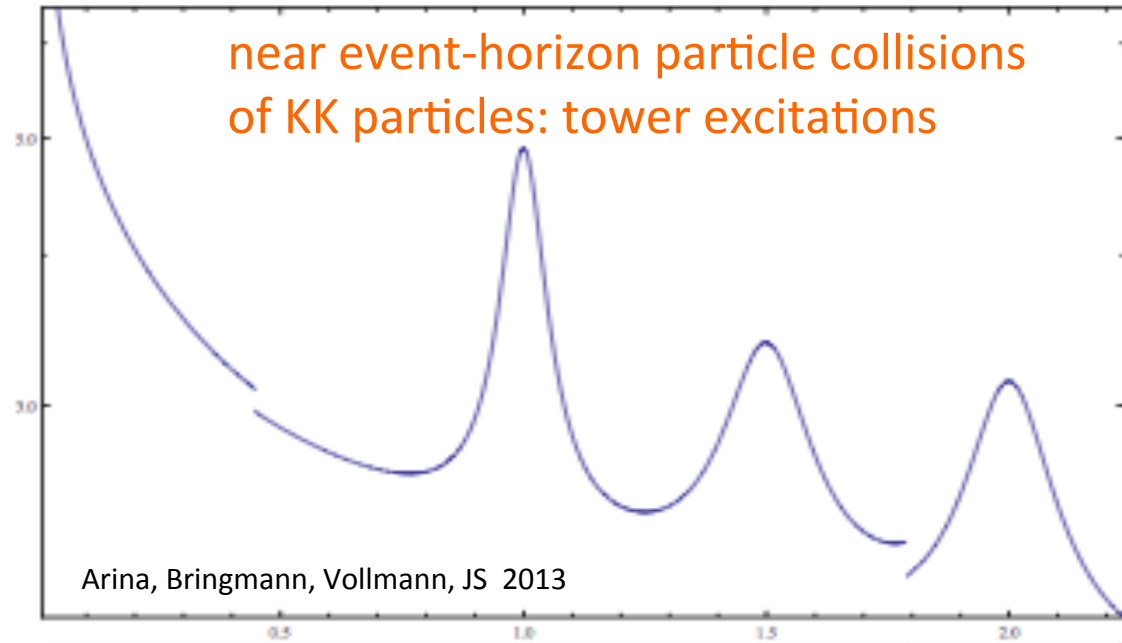
relativistic jets emanate from ergosphere, so  
high energy e,p collide with DM spike particles



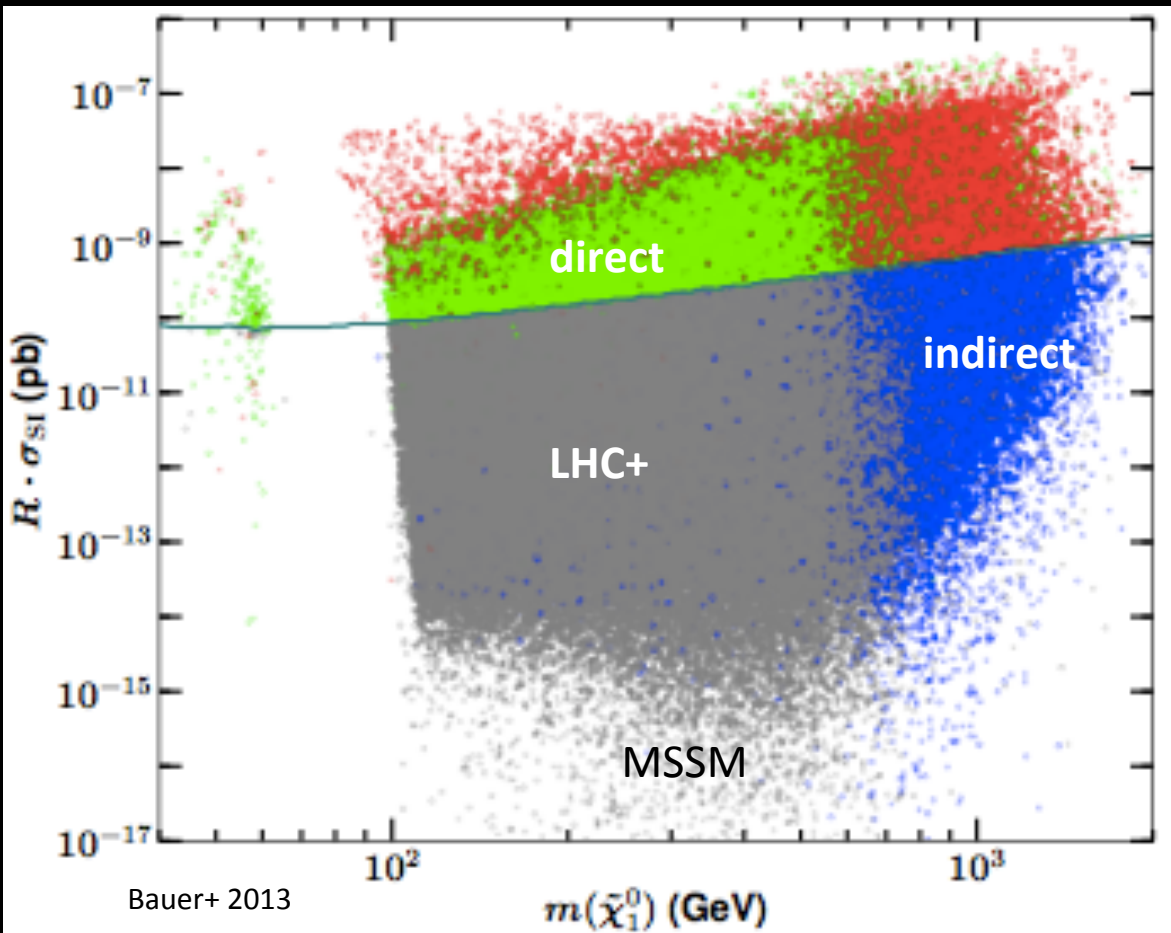




near event-horizon particle collisions  
of KK particles: tower excitations



# THE FUTURE



Following the light Higgs discovery and the failure to find evidence for SUSY, the new frontier for particle physics is likely to be a 100 TeV collider

The new frontier for DM detection will shift from LDM (10-100 GeV) to HDM (1-30 TeV)

# QUESTIONS

What if DM is a gravitino?

Could DM be baryonic?

What if there is no DM: any proponents?

When do we stop searching for particle DM?