

Dark matter indirect searches using Radio and MeV gamma rays

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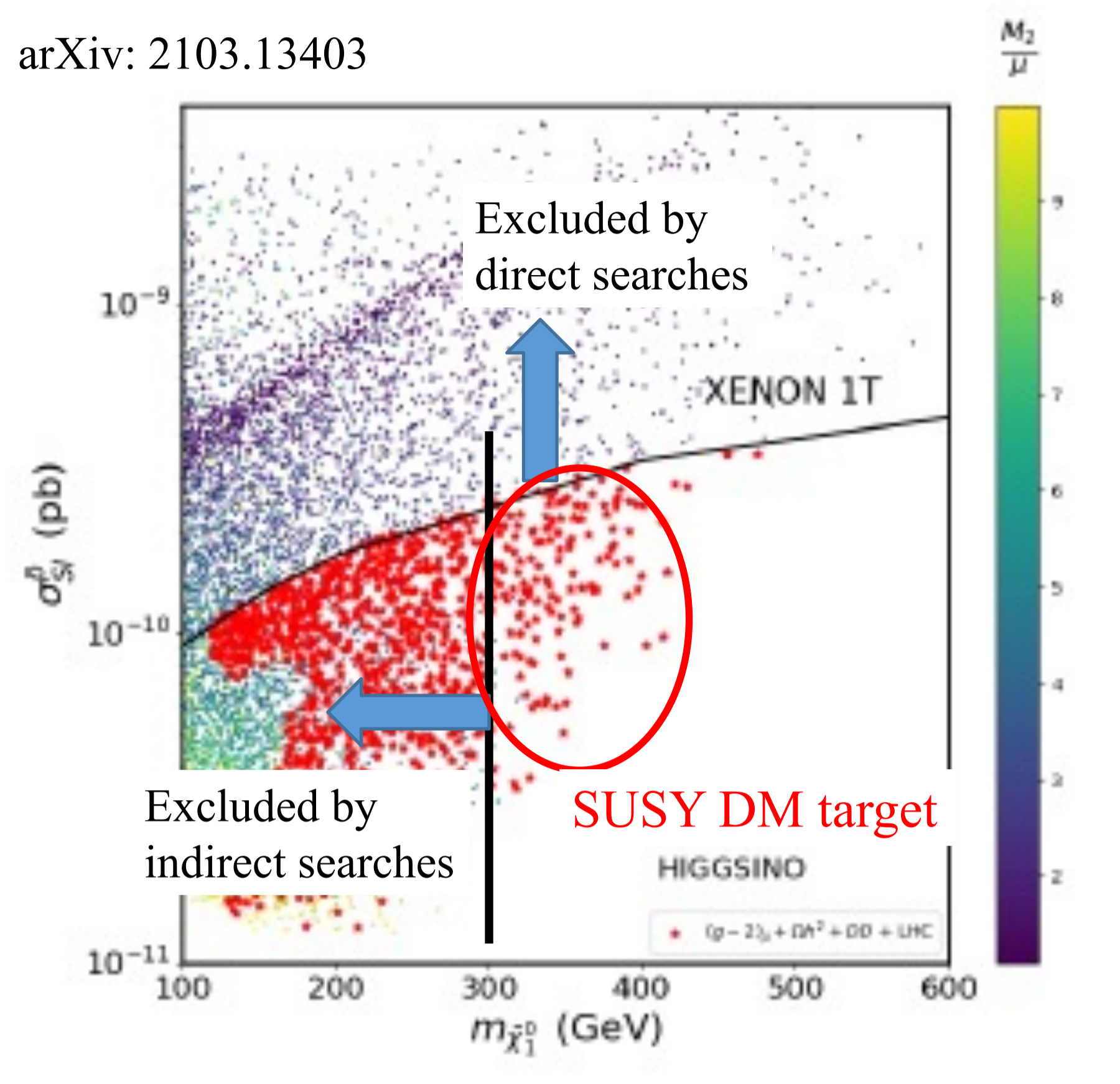
The University of Tokyo

(Thanks to Tomohiro Inada, Kaz Kohri)



Strong motivation for SUSY DM

arXiv: 2103.13403

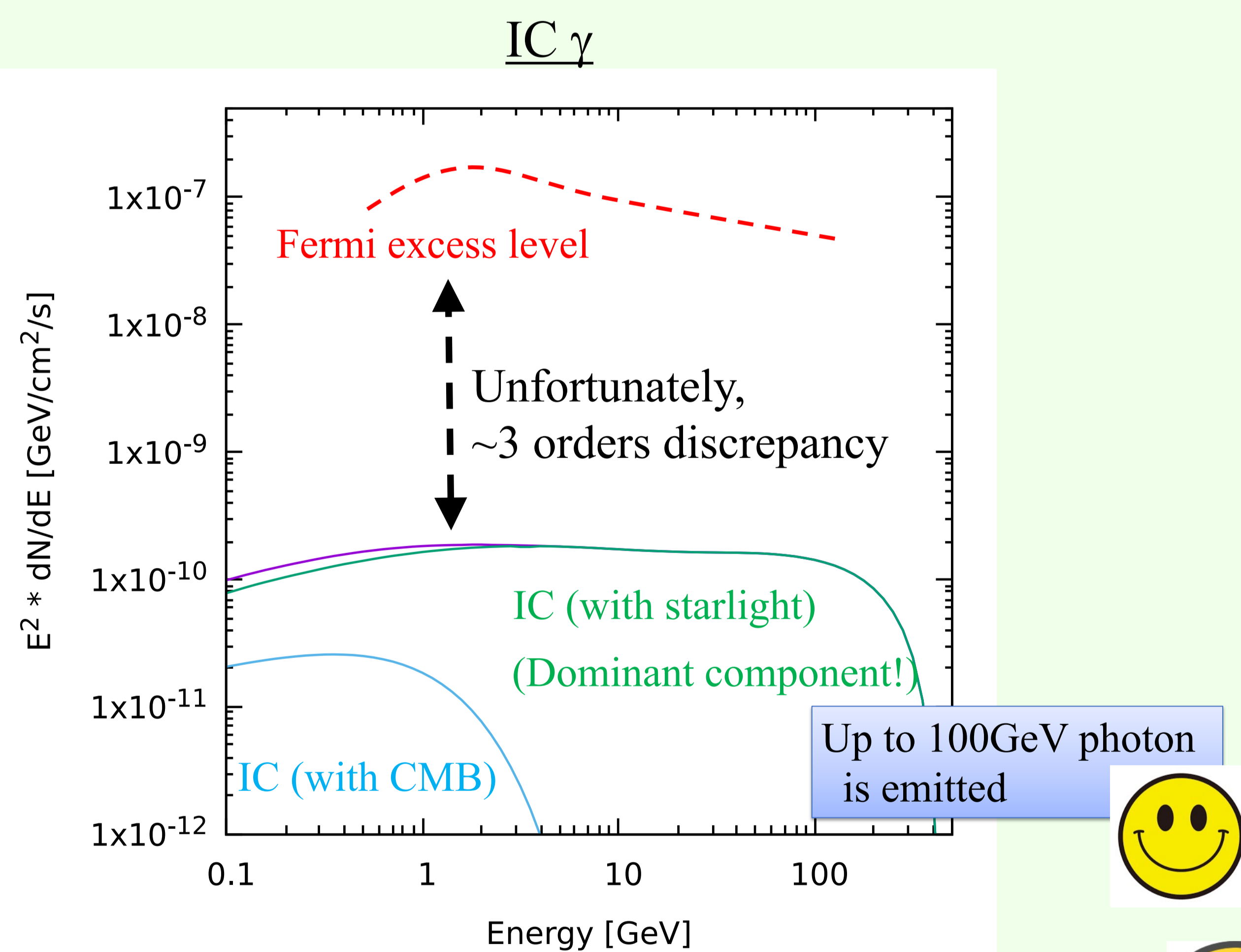


- μ g-2 anomaly favors light Wino/Higgsino/Bino DM (>300GeV region still escapes from all constraints!)
- Fermi observes unknown \sim GeV γ excess from the GC (Maybe from DM annihilations)

Setup for calculations

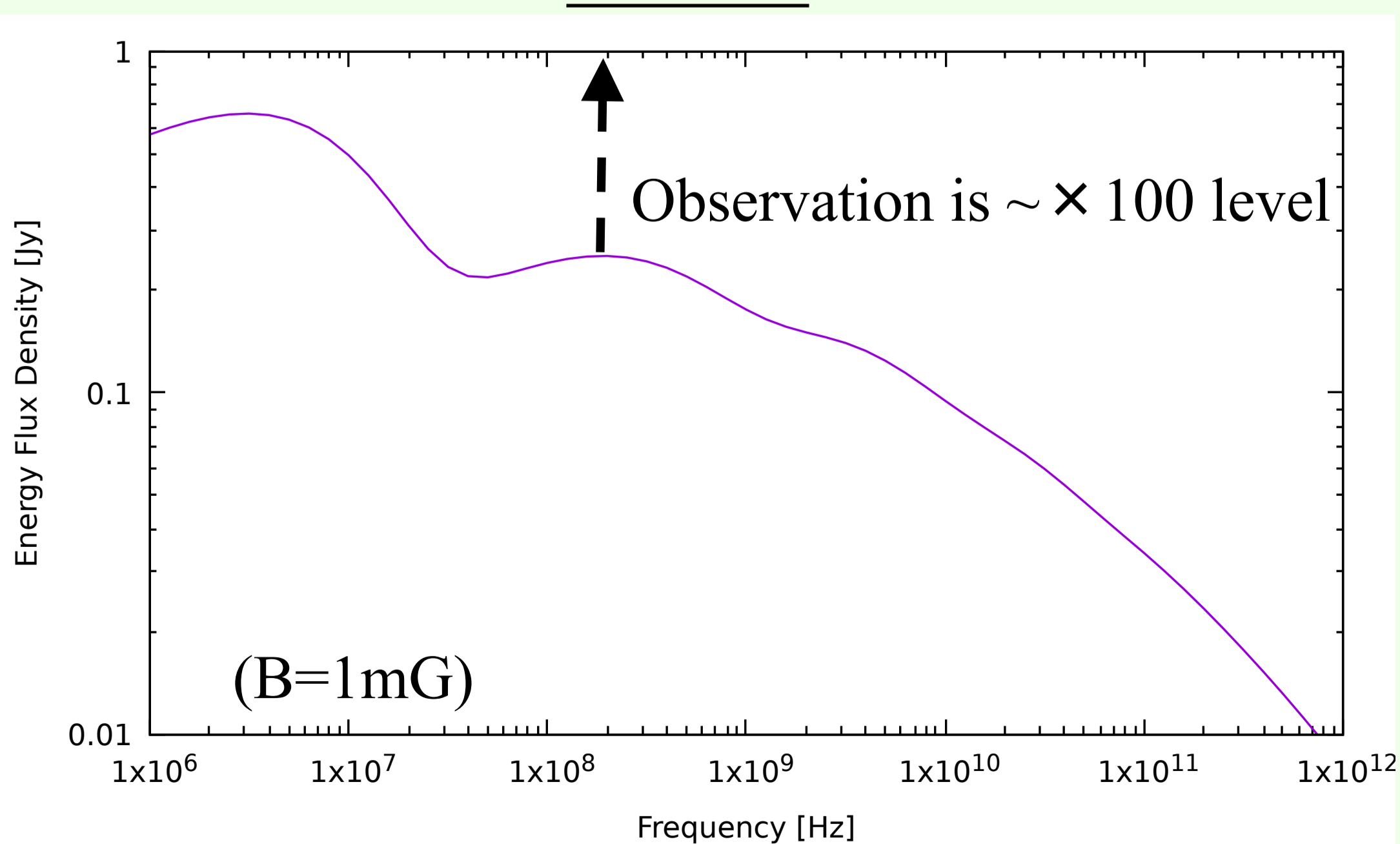
- darksusy 6.2.5 is used for the SUSY annihilation
- $M_\chi=500\text{GeV}$, $\langle\sigma v\rangle=3\times 10^{-26}\text{cm}^3\text{s}^{-1}$
- RX-DMFIT (JCAP09(2017)027) is used for diffusion & SR/IC processes
- NFW profile is assumed ($\gamma=1$ for GC and Draco)
- $B=1\text{mG}$ ($1\mu\text{G}$) for the GC(Draco) is assumed

Calculated signals from the GC



- IC result is \sim 3 orders of magnitudes smaller than Fermi excess

SR radio



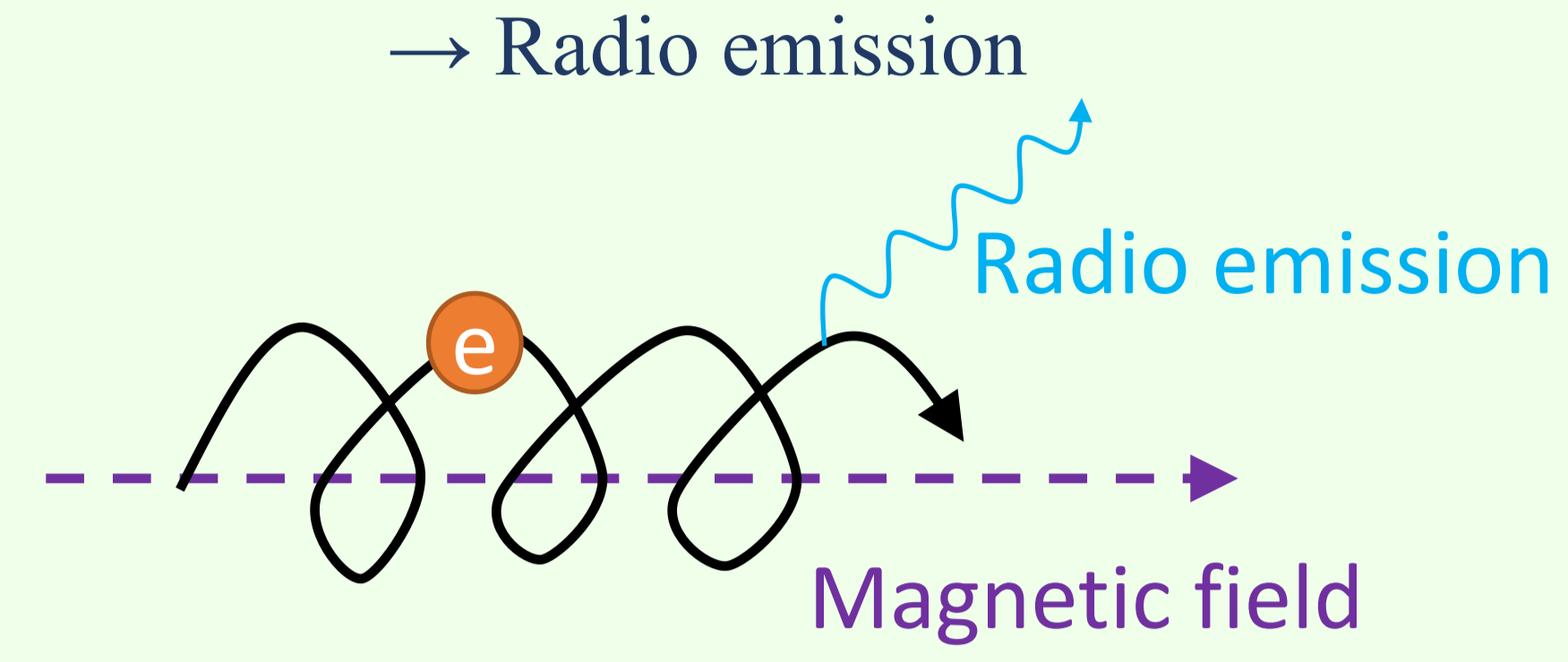
- SR result is also \sim 1% level of the observation

The GC is too noisy to observe DM!!

Secondary Photon emission processes from annihilated DMs

Electrons from DM annihilations emits photons by two processes

- Synchrotron radiation (SR) under magnetic field



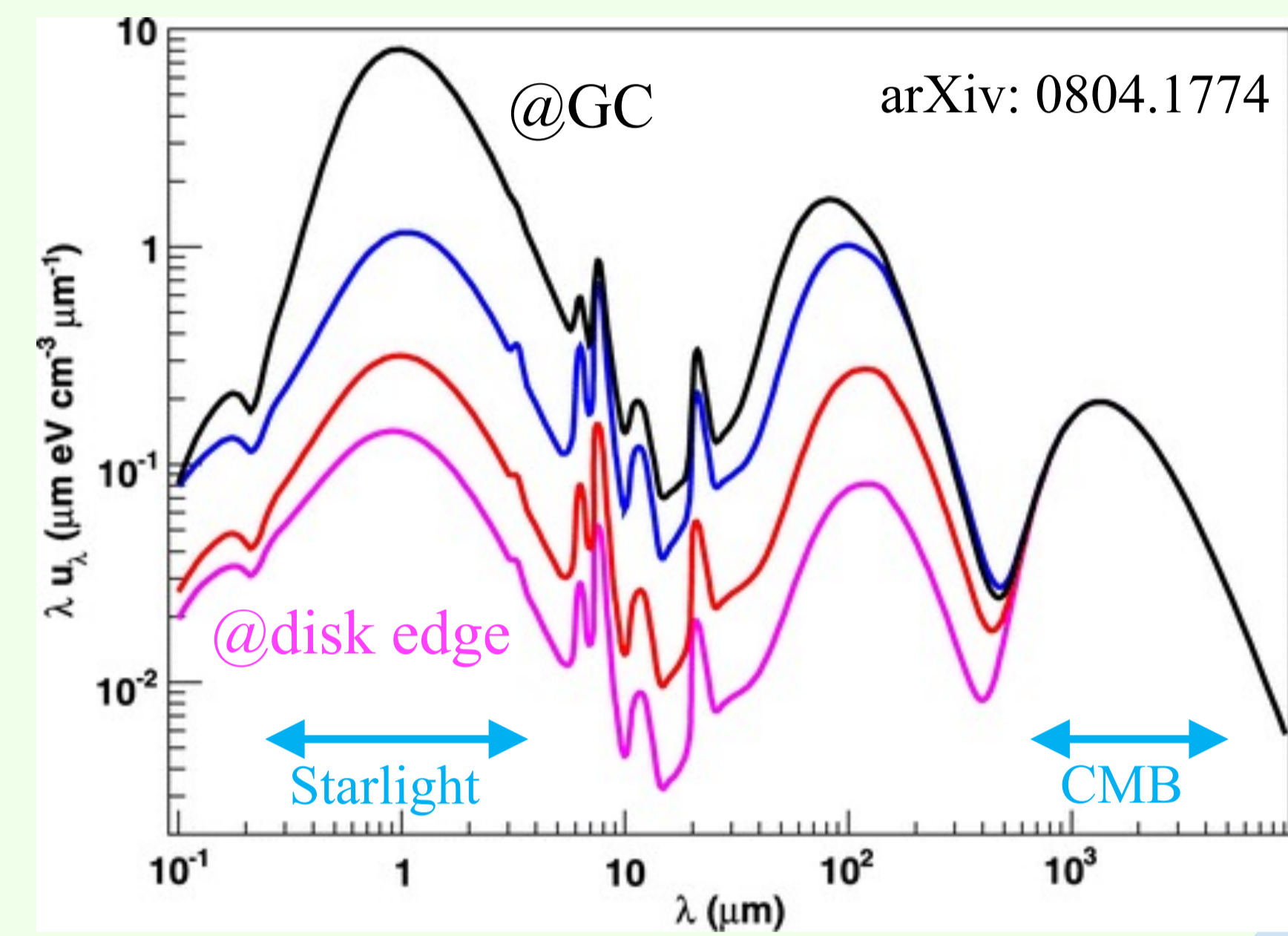
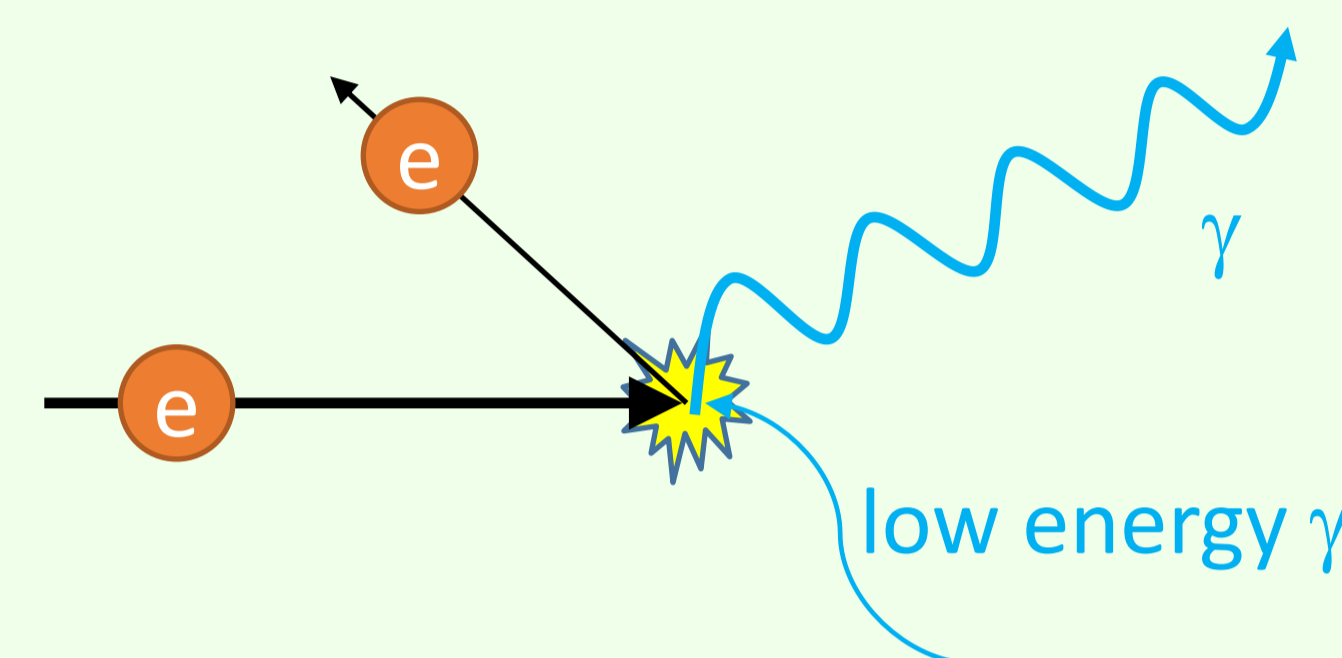
In the GC photons from stars are dominant. High energy photon is emitted from IC



- Inverse Compton (IC) with the CMB or starlight photons

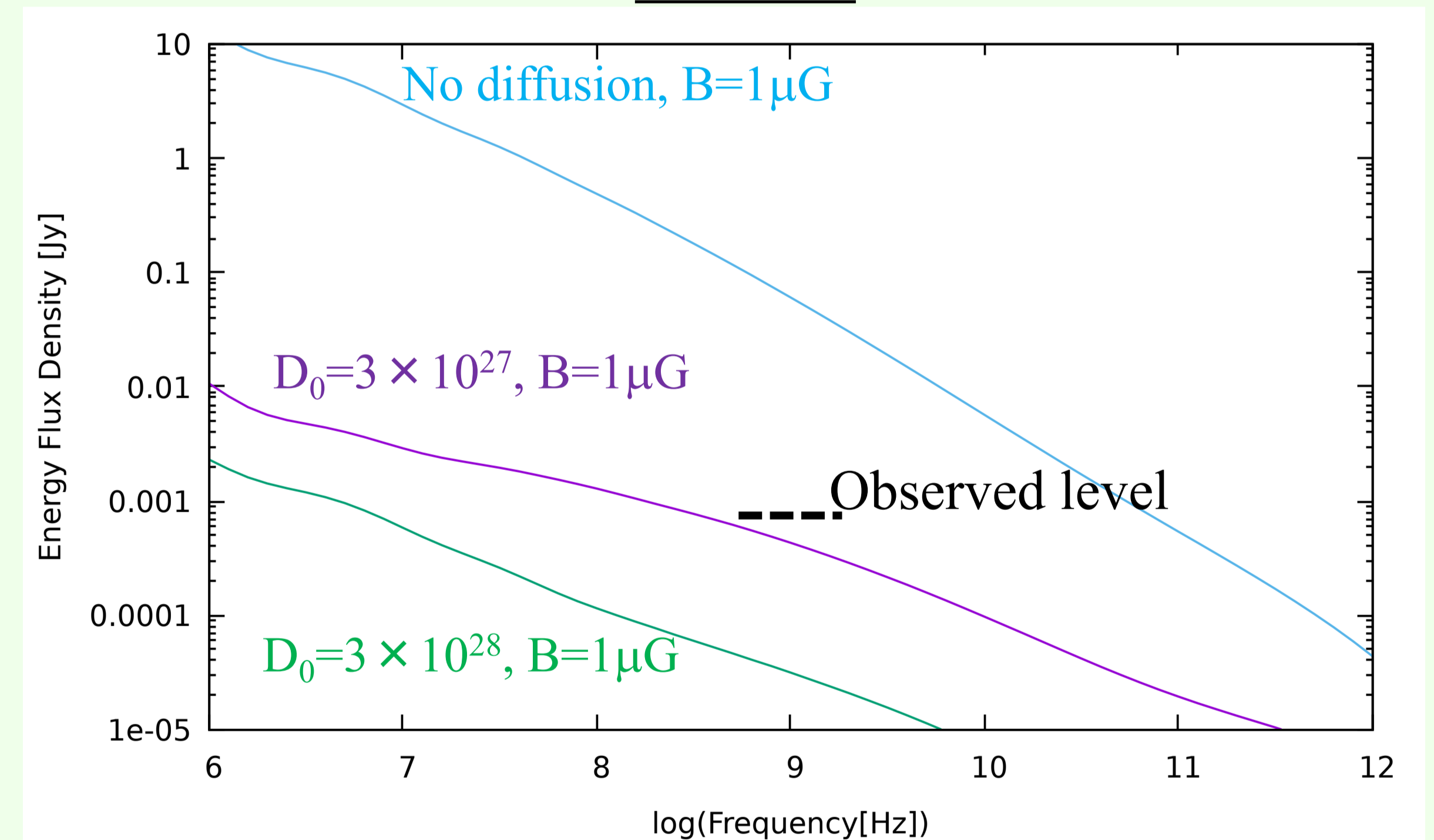
→ MeV/GeV γ emissions

low energy γ spectrum



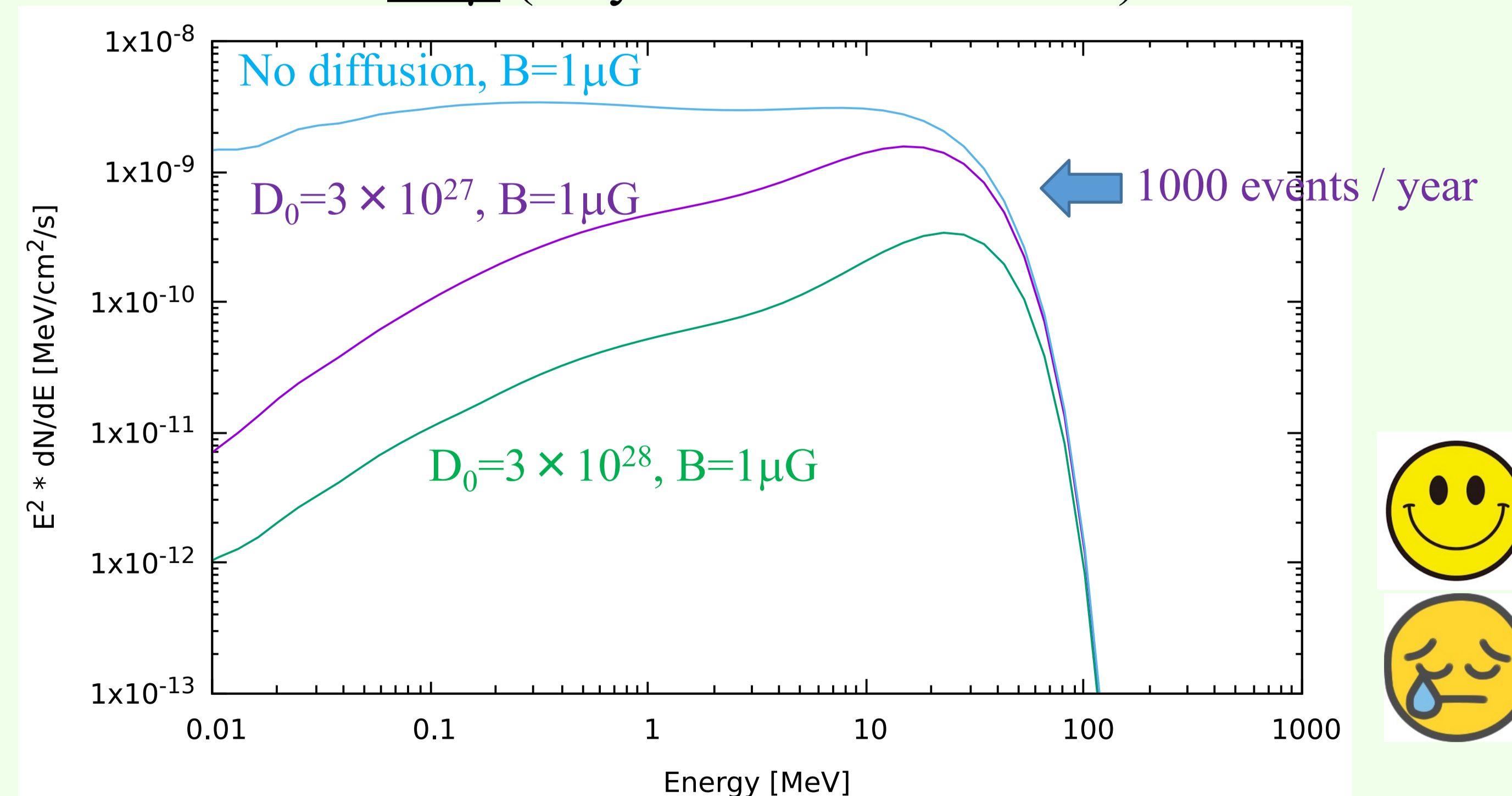
Calculated signals from a dSph (Draco)

SR radio



- SR spectrum is compatible with the observation under some diffusion or magnetic field parameters. Measurements @ various Freq. are necessary

IC gamma (only with CMB assumed)



- MeV/GeV γ ray can be a clear signal, but the observational data are poor. → Need (large detector 10m^2 & long exposure (10^7sec) & high angular resolution ($< 1^\circ$))

Emulsion on ISS?

