

APC seminar

Alexander Korochkin

APC Paris & INR RAS Moscow

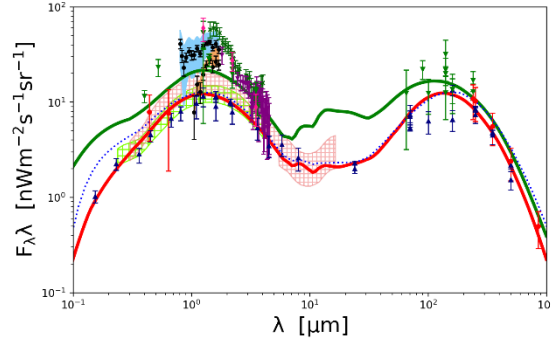
Supervisors:

Dmitri Semikoz, APC Paris

Grigory Rubtsov, INR RAS Moscow

Previous projects

- New flexible EBL model**

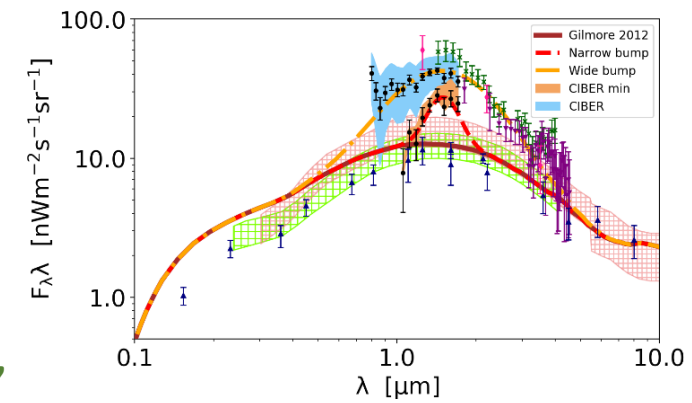


A.Korochkin, G.Rubtsov, arXiv: 1712.06579

- Near-IR excess in the EBL**

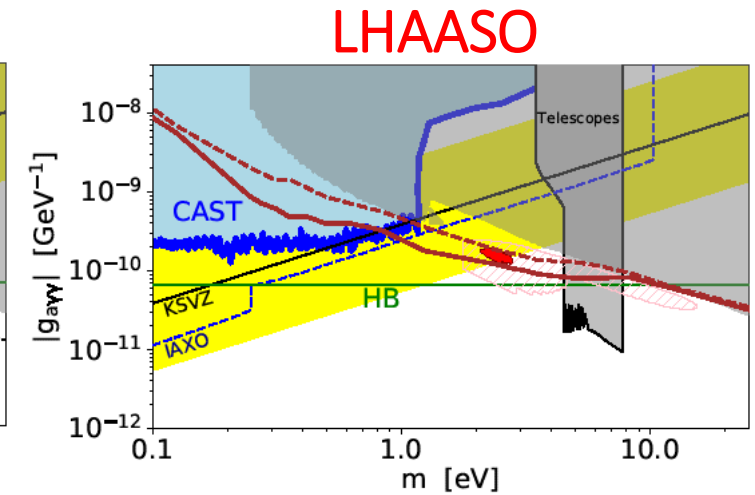
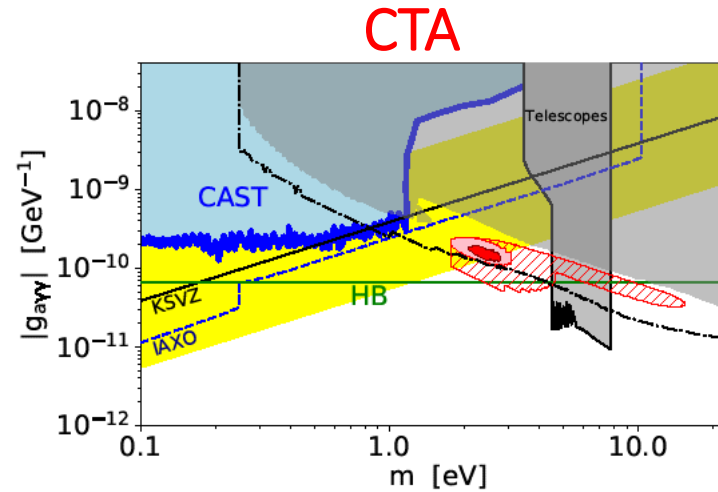
Possibility of an excess in the form of a narrow feature

A.Korochkin, A.Neronov, D.Semikoz, arXiv: 1906.12168



- Relic decaying eV-mass axion-like particles**

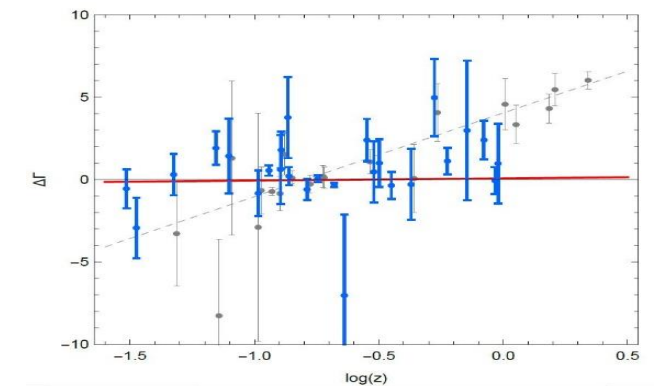
A.Korochkin, A.Neronov, D.Semikoz, arXiv: 1911.13291



- Anomalous transparency of the Universe**

A.Korochkin, G.Rubtsov, S.Troitsky, arXiv: 1810.03443

The dependence of the break strength on the redshift was not confirmed



Current project

Cosmological Magnetic Fields

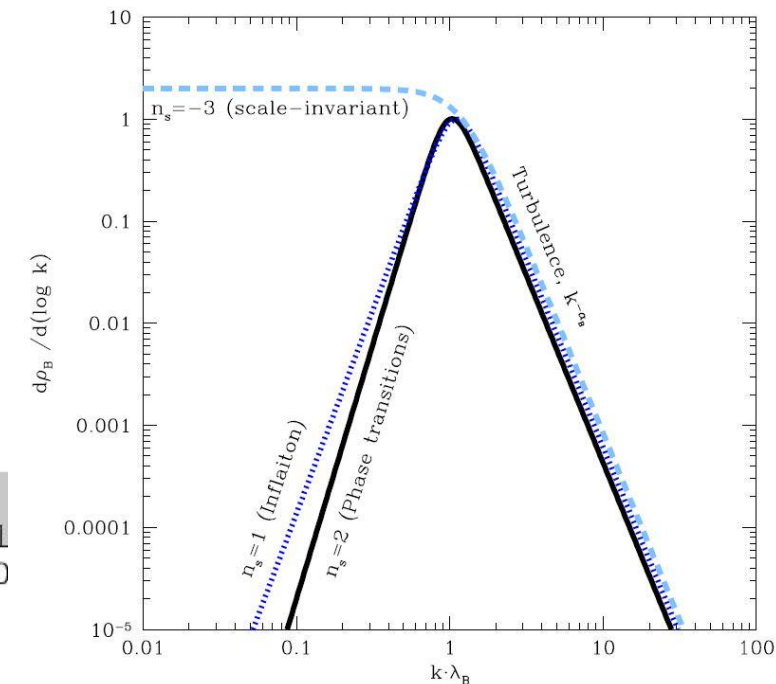
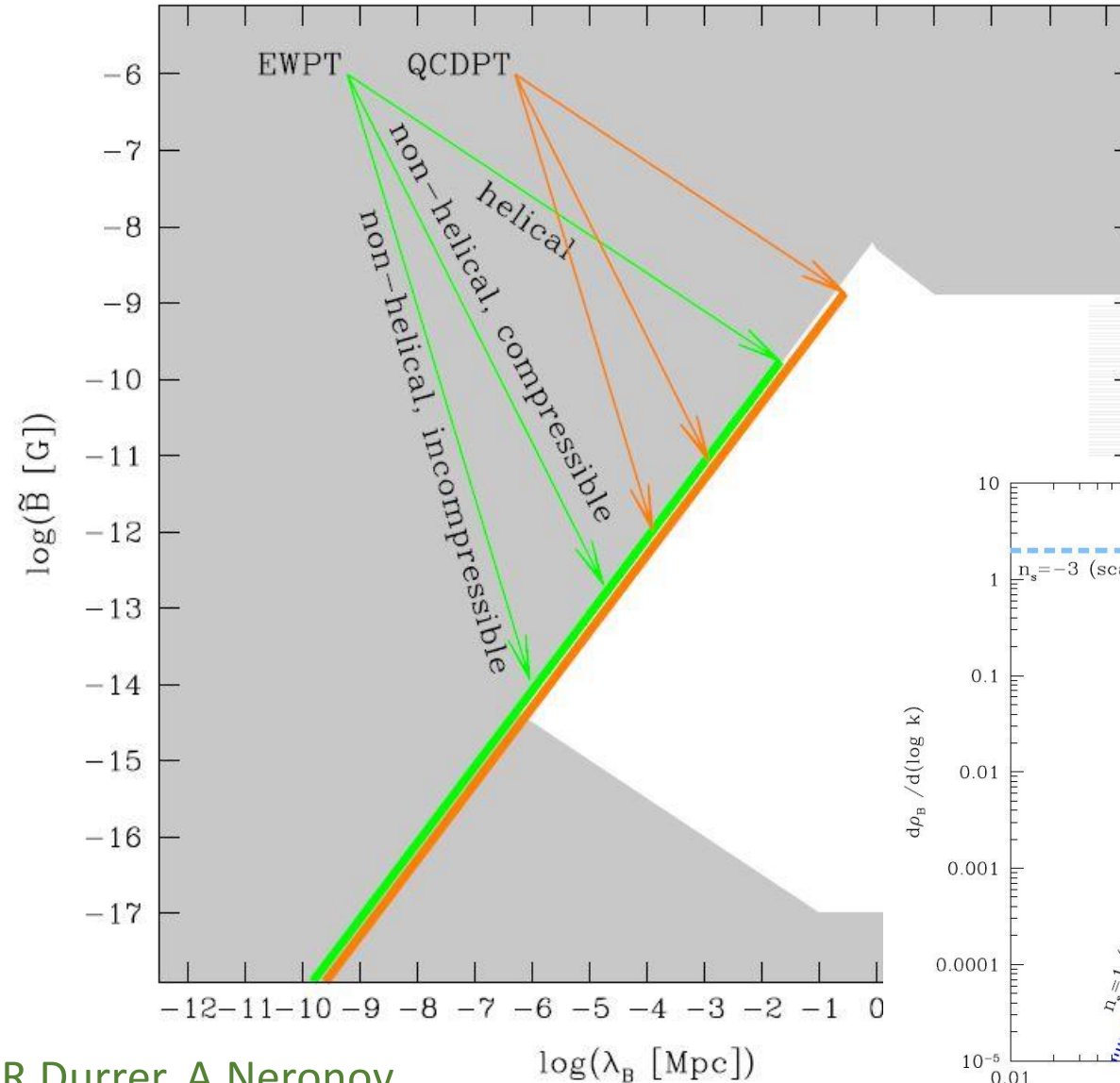
Properties of IGMF

- Turbulent
- Strength B
- Correlation length λ
- Power spectrum

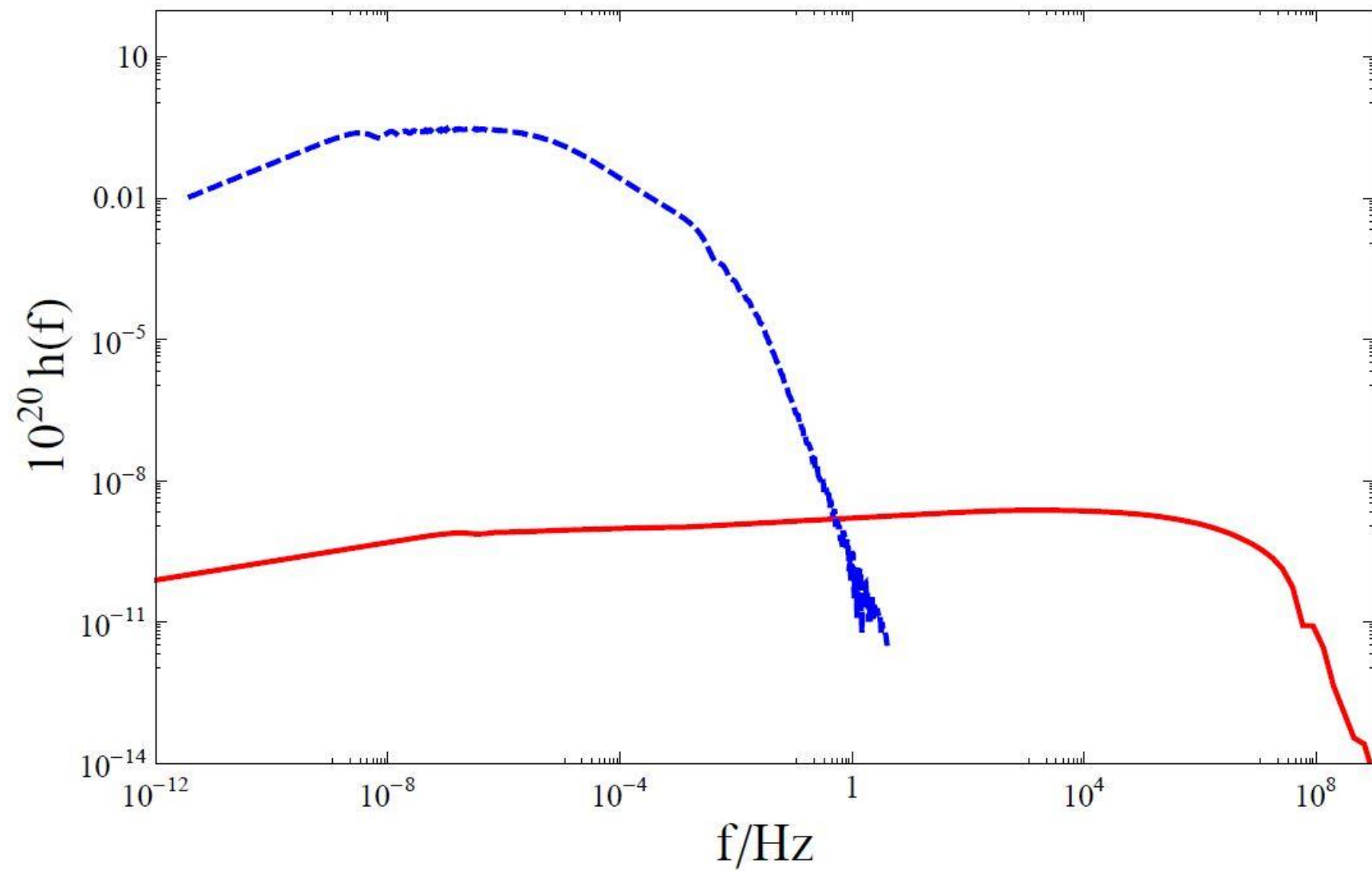
Generation of IGMF

Phase transitions

Inflation

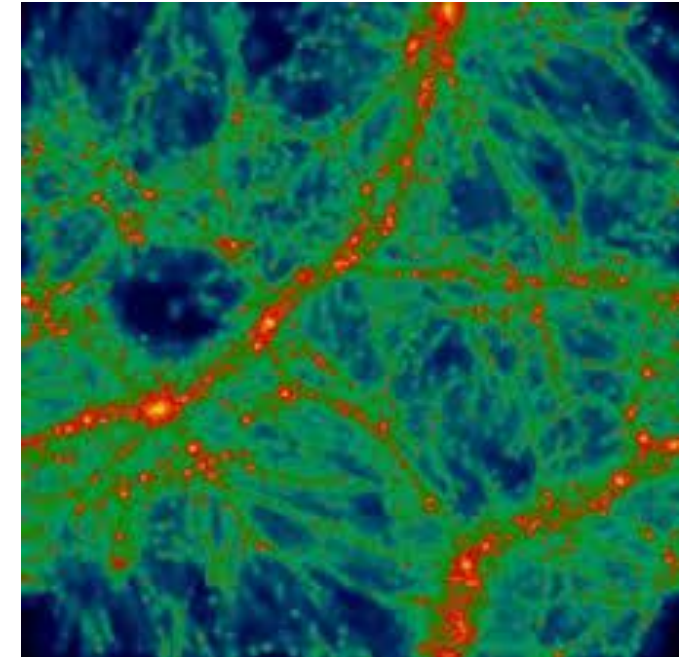
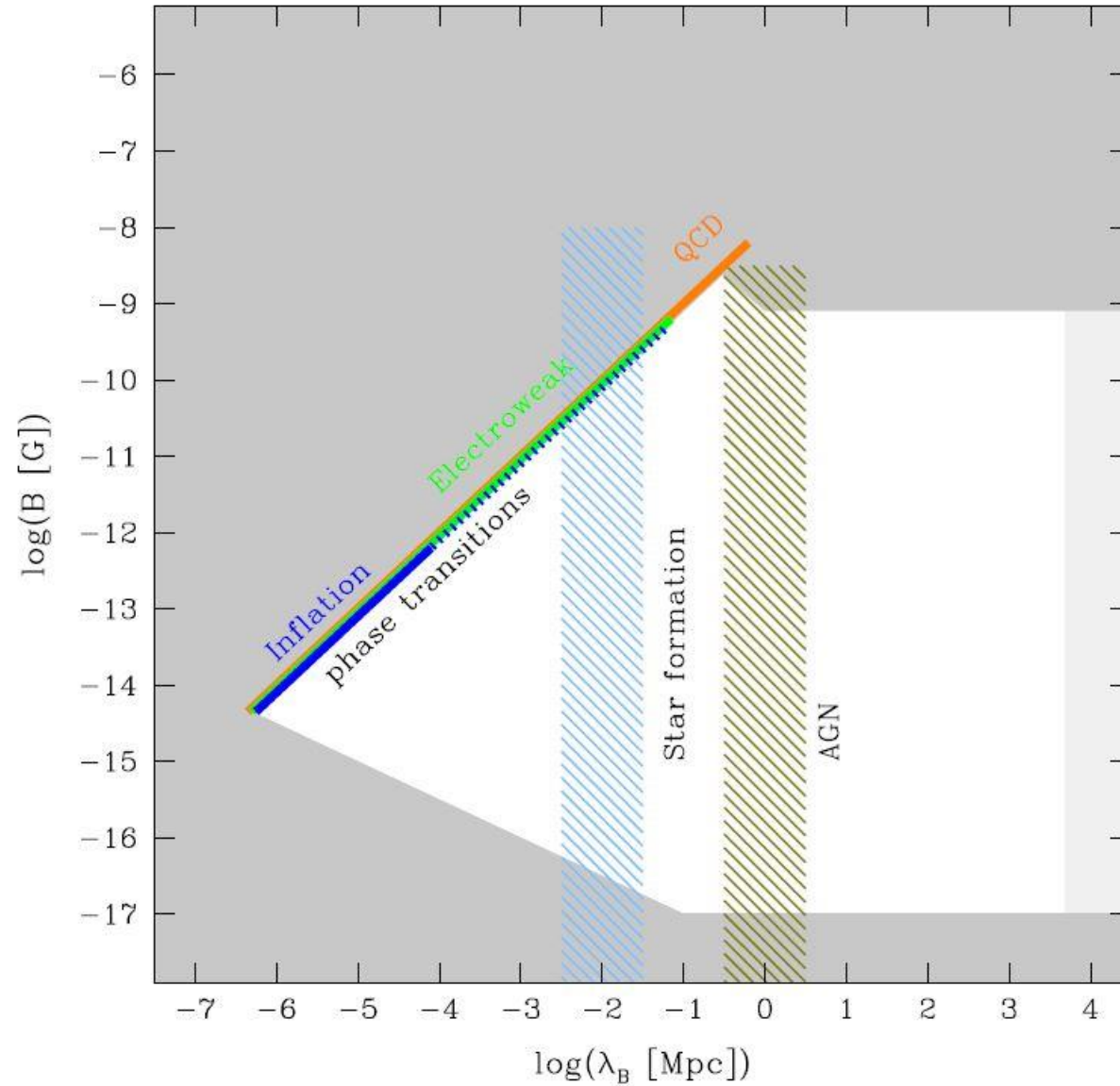


pic from R.Durrer, A.Neronov
arXiv:1303.7121



Caprini C, Durrer R, Fenu E
arXiv:0906.4976

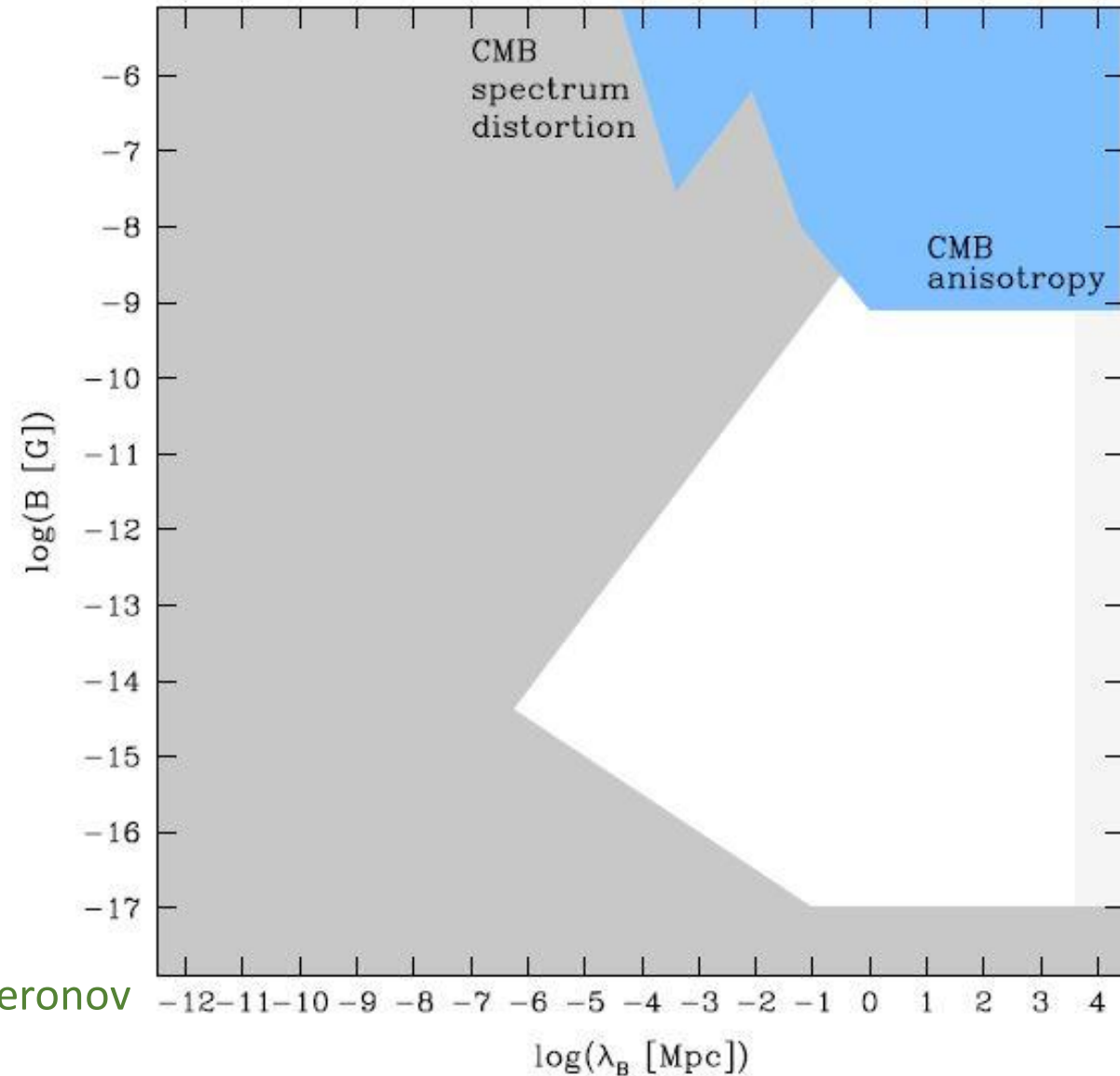
MF in the voids of LSS



pic from R.Durrer, A.Neronov
arXiv:1303.7121

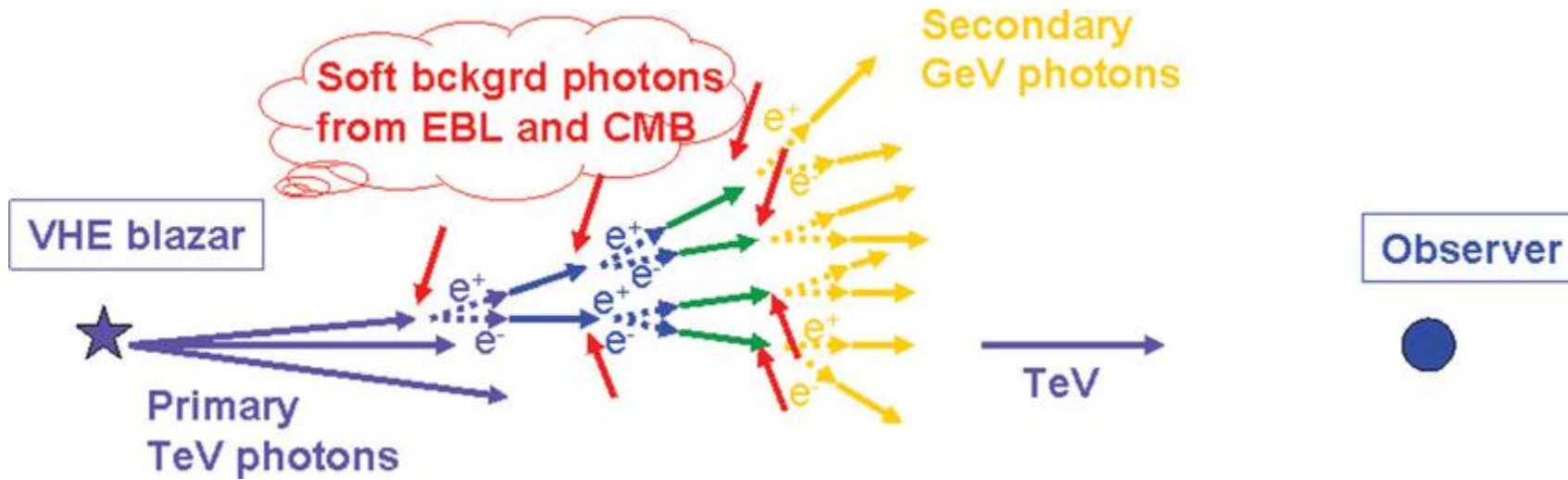
Upper limits

- Faraday rotation
- CMB



pic from R.Durrer, A.Neronov
arXiv:1303.7121

Lower limits: electromagnetic cascades

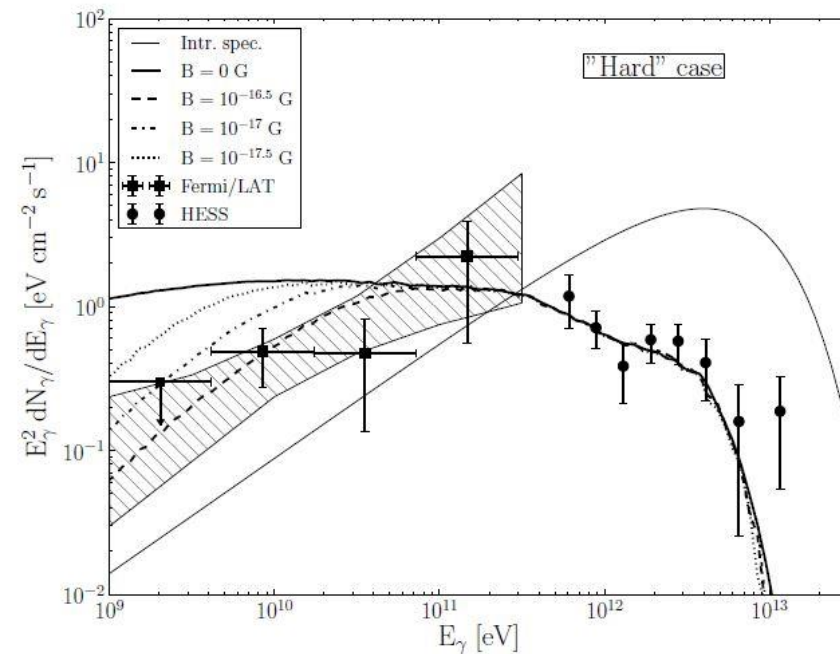
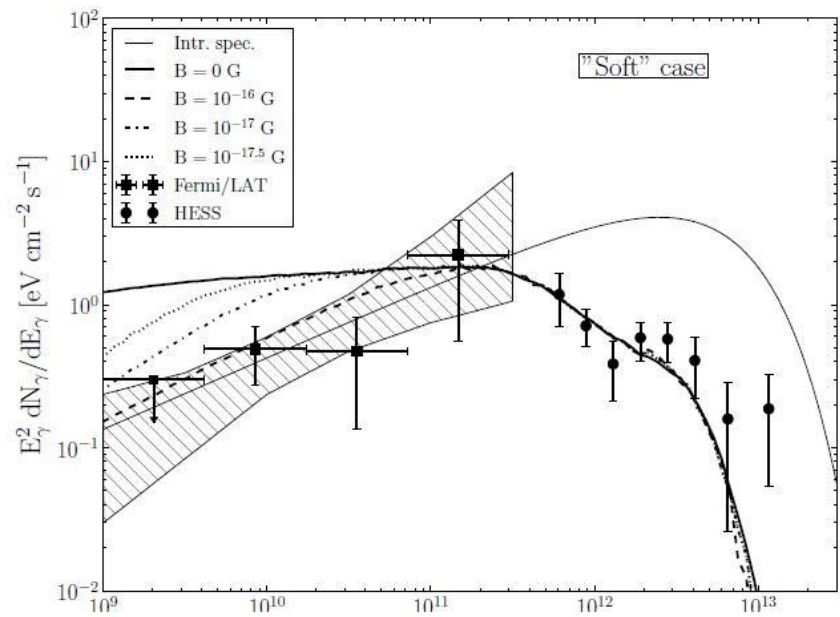


Picture from IAU Symp. 294 (2013) 459-470

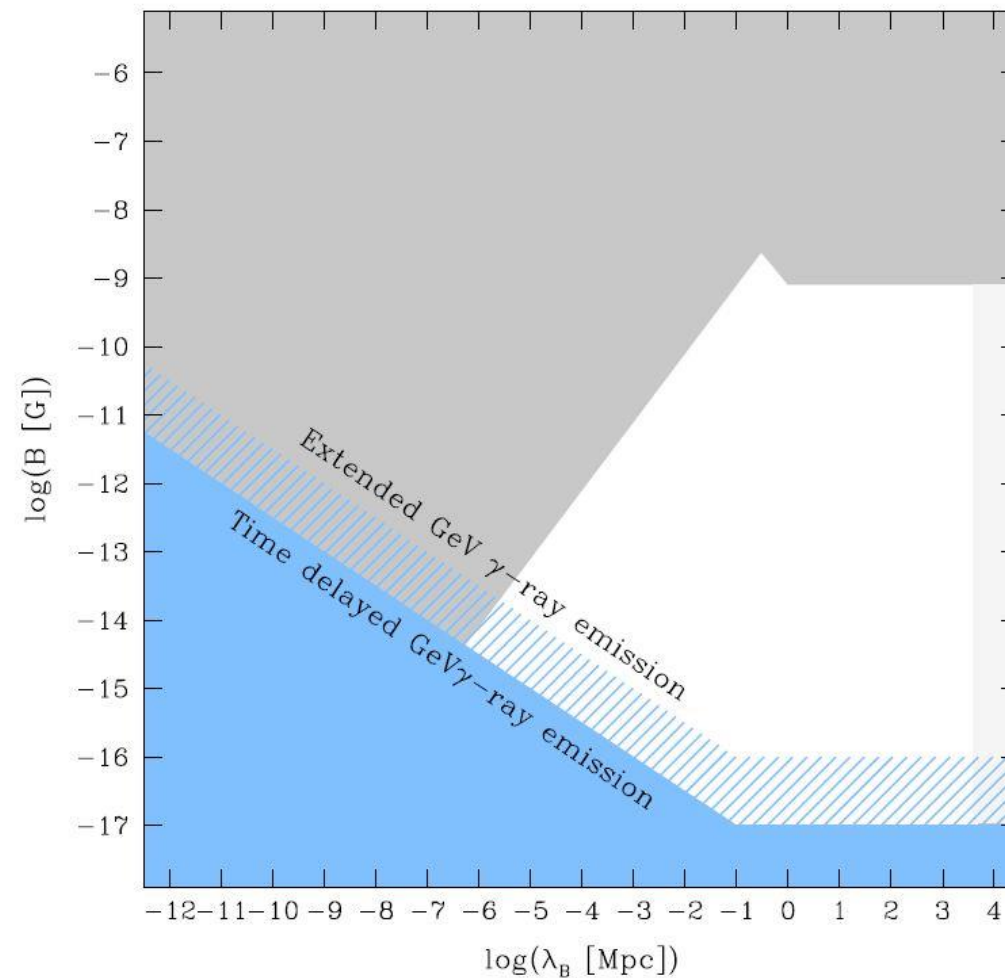
- Delayed photons
- Additional flux at lower energies
- Extended emission around point source

Aharonian FA, Coppi PS, Voelk HJ
arXiv:astro-ph/9312045

A.Neronov, D.Semikoz
arXiv:astro-ph/0604607

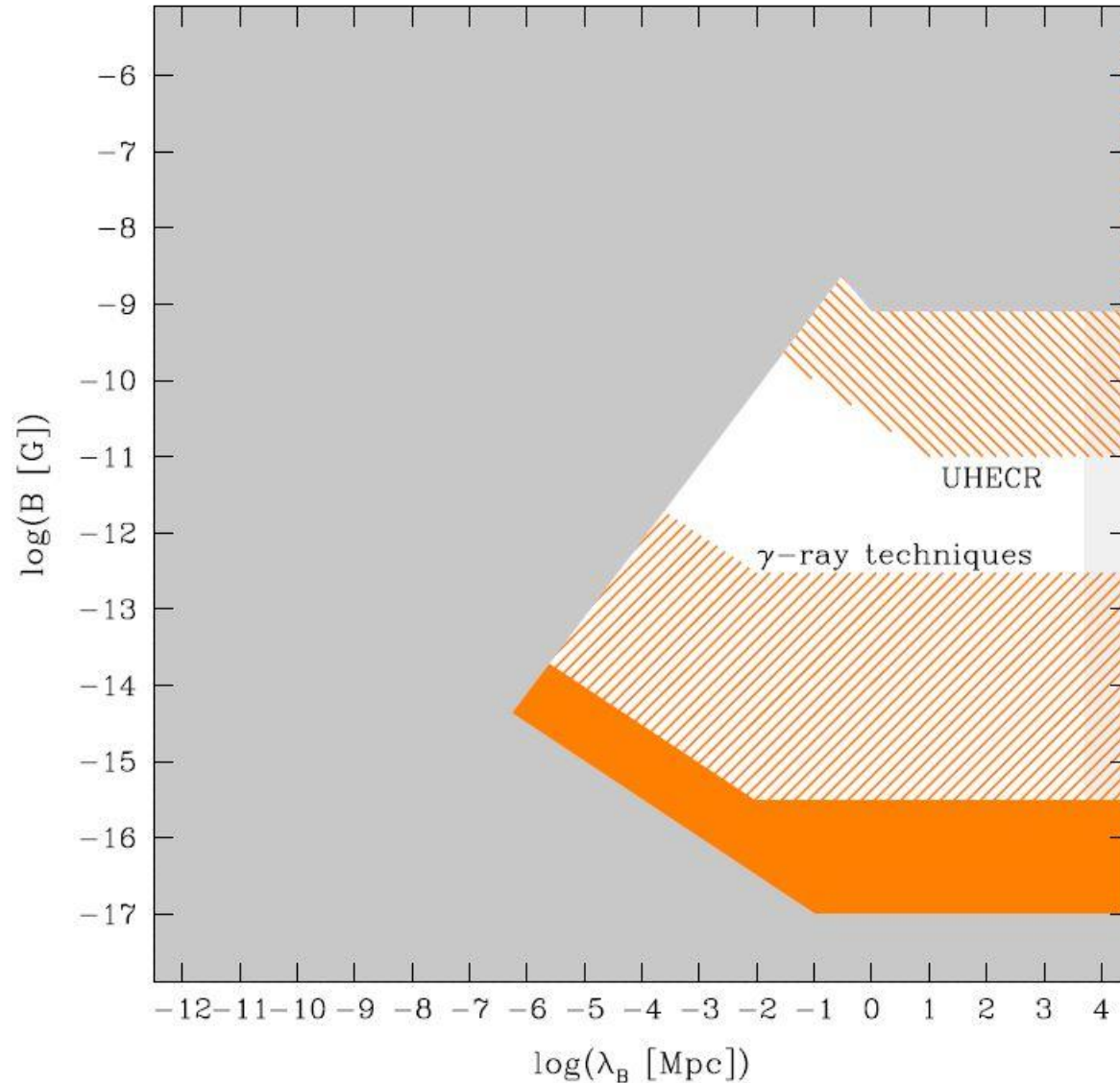


- Delayed photons
- Additional flux at lower energies
- Extended emission around point source



Vovk I, Taylor A.M, Semikoz D, Neronov A
arXiv:1112.2534

Next generation constraints

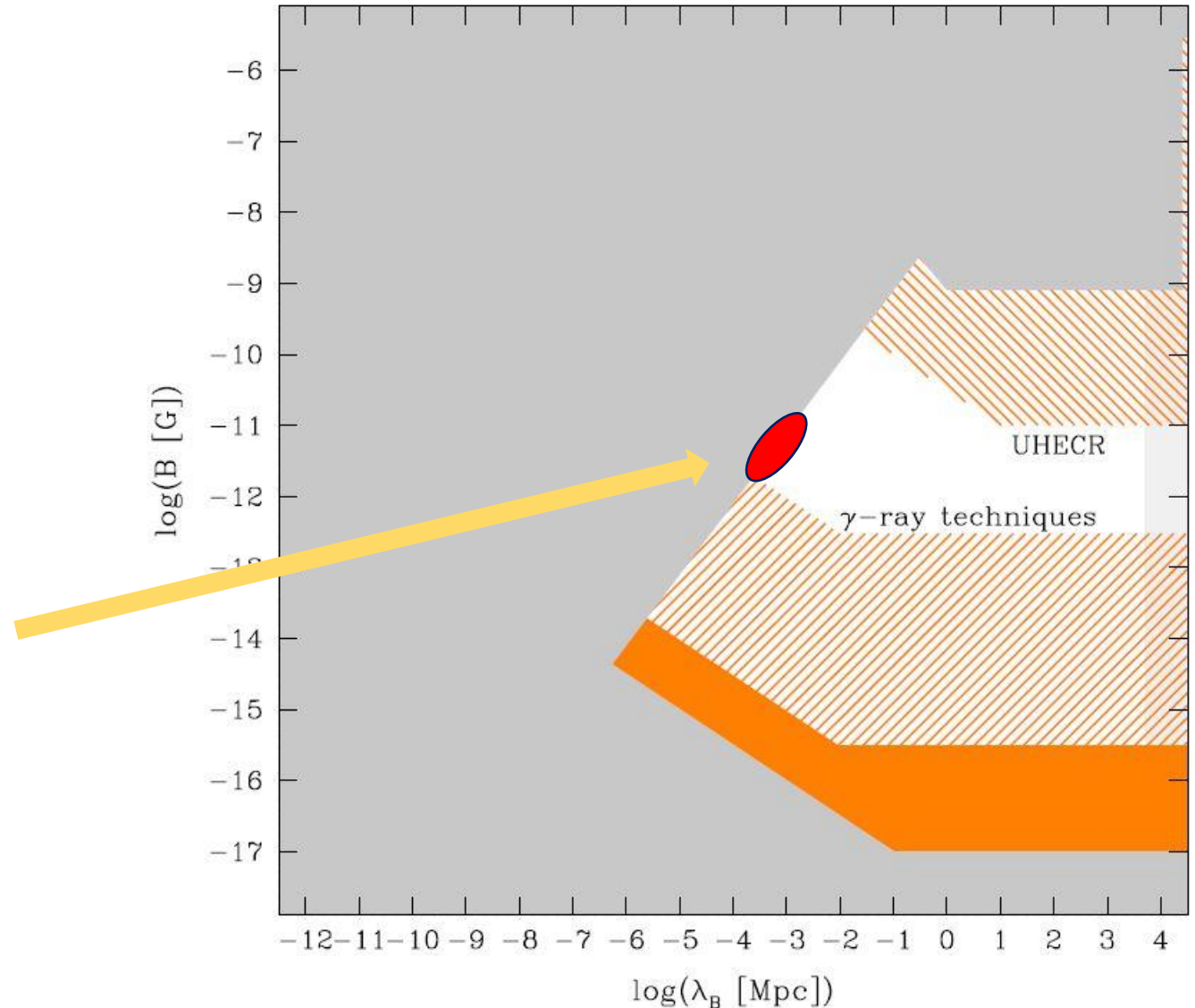


pic from R.Durrer, A.Neronov
arXiv:1303.7121

Hubble tension

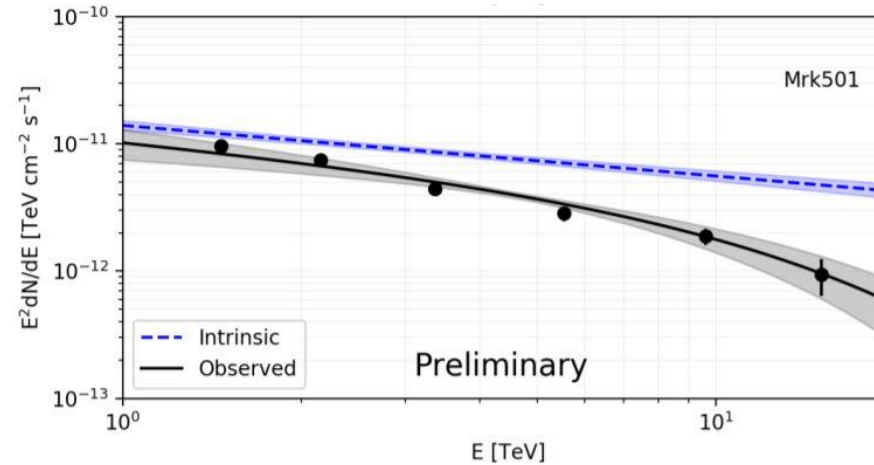
- The additional baryon inhomogeneities, induced by primordial magnetic fields present in the plasma prior to recombination can relieve Hubble tension
- Required $B \sim 10^{(-11)} \text{ G}$
 $\lambda \sim 1 \text{ kpc}$

K.Jedamzik, L.Pogosian,
arXiv: 2004.09487



Nearest blazar: mrk501

- No cutoff up to 20 TeV
- $z = 0.034$
- We extended spectrum up to 100 TeV

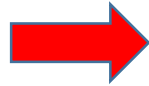


Coutino de Leon, S. et al,
arXiv: 1909.01179

CRbeam: 3D Monte-Carlo cascade simulation

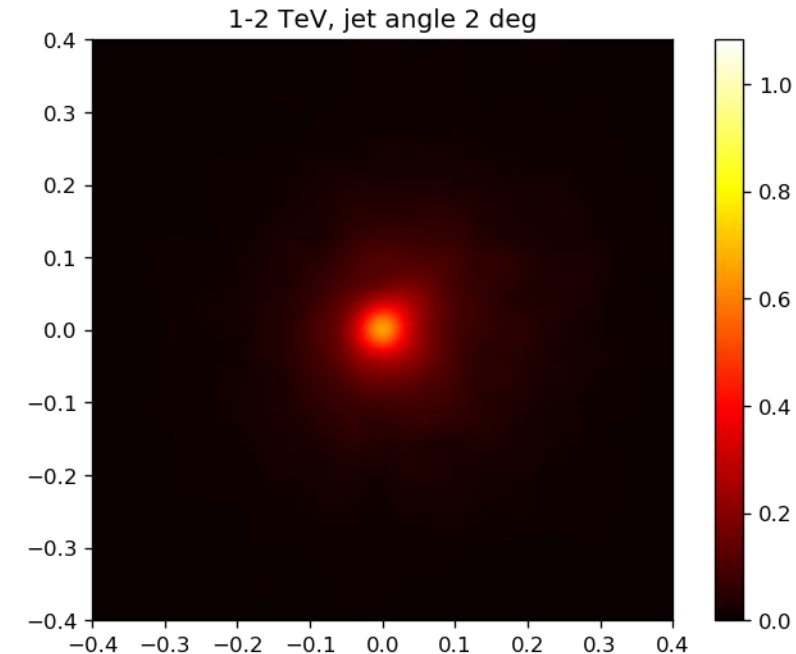
Input:

- Parameters of the spectrum
- Parameters of the jet (angle of incidence, opening angle ...)
- Background models (CMB, EBL, MF)

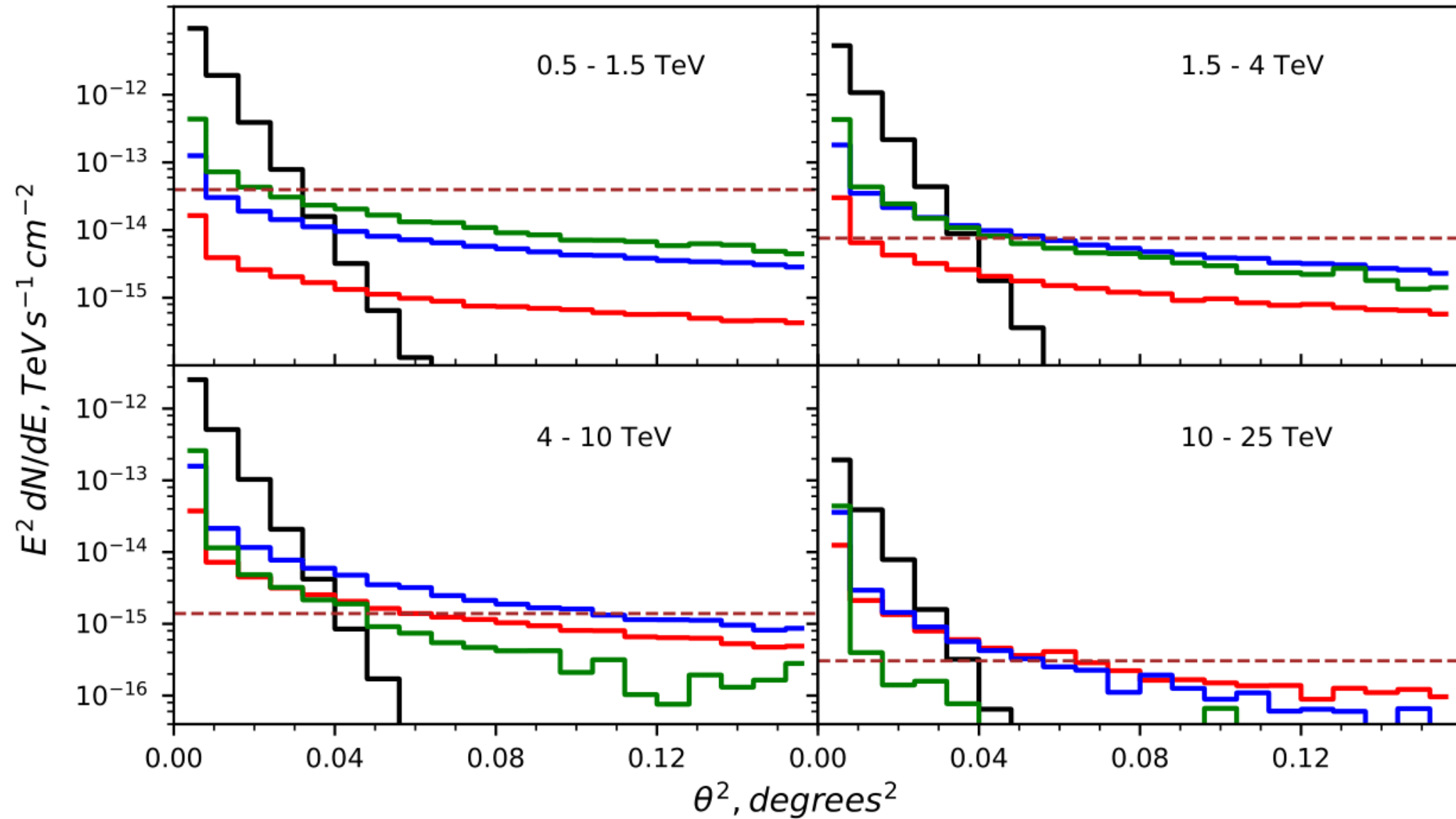


Output:

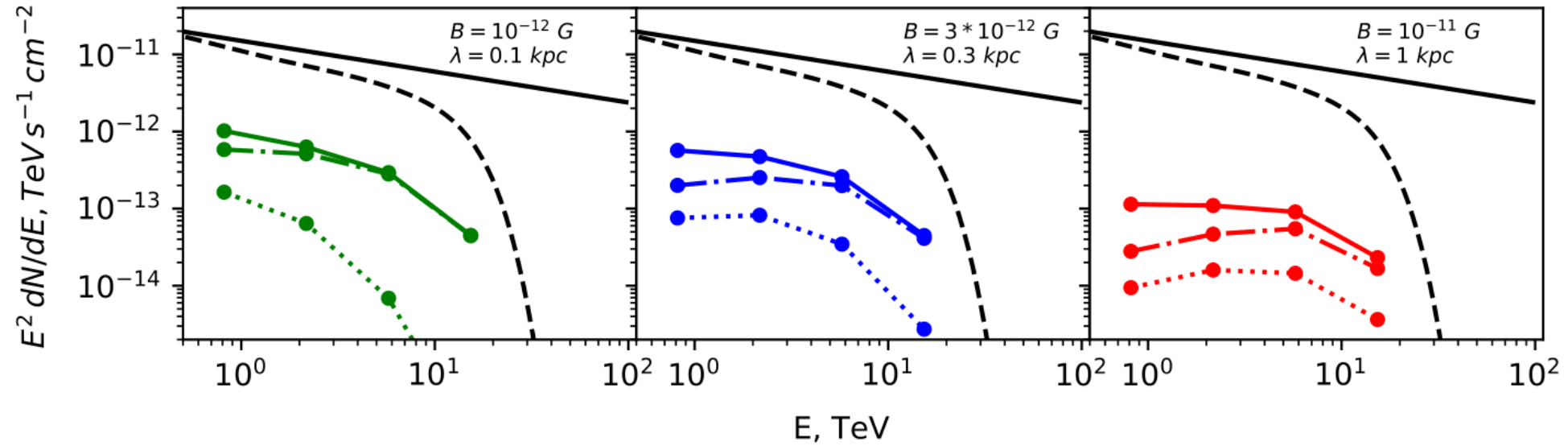
- Distribution of primary and secondary particles



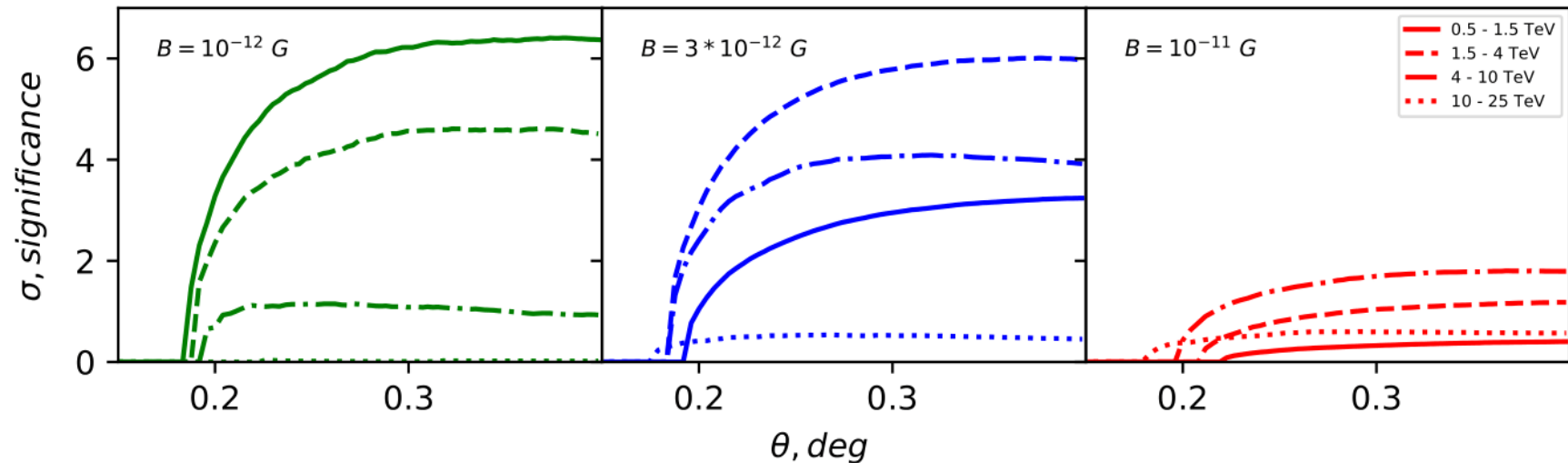
Angular spectrum



Spectrum



Significance of detection



**Thank you for your
attention**