


computational methods for astroparticle propagation

class 3: propagation of charged particles

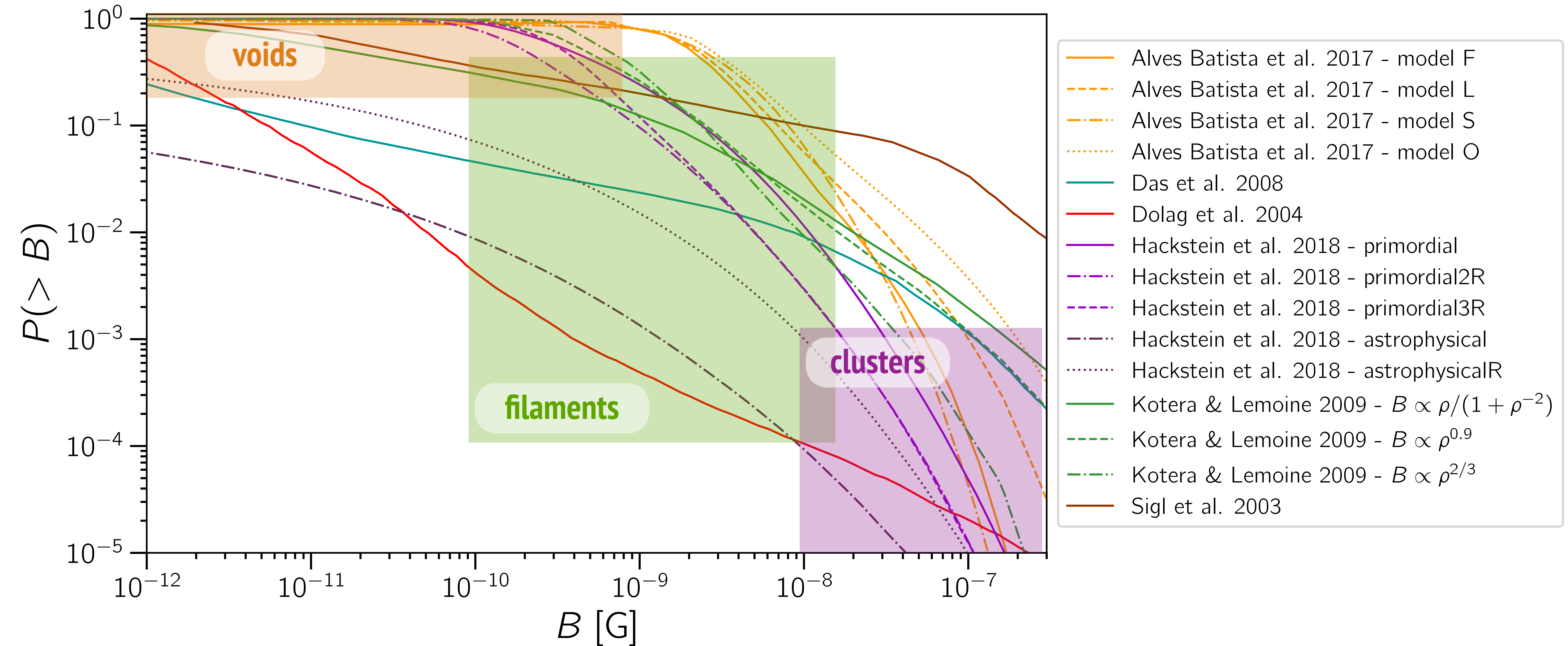
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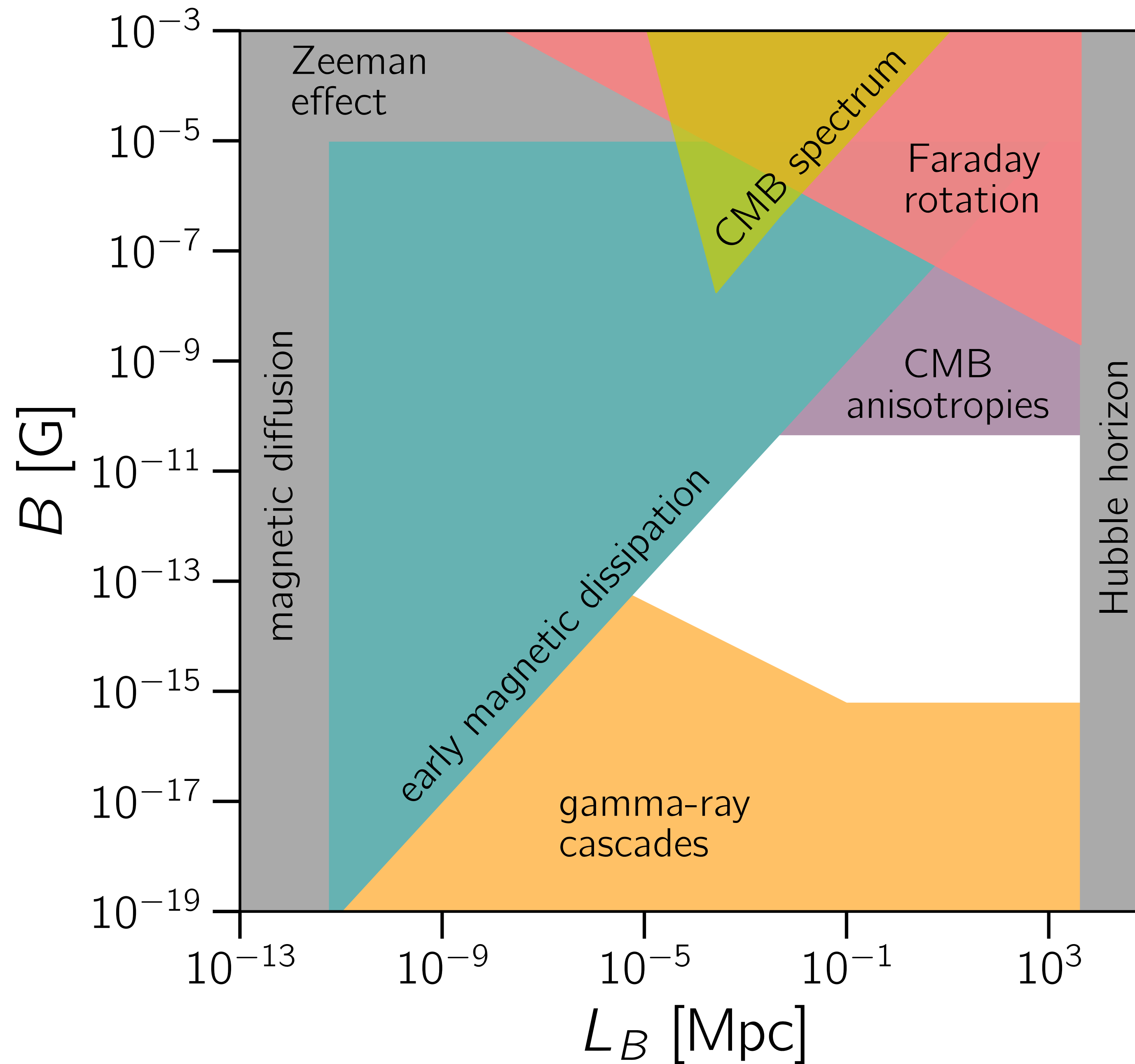
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IFSC-USP
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magnetic fields in the large-scale structure of the universe



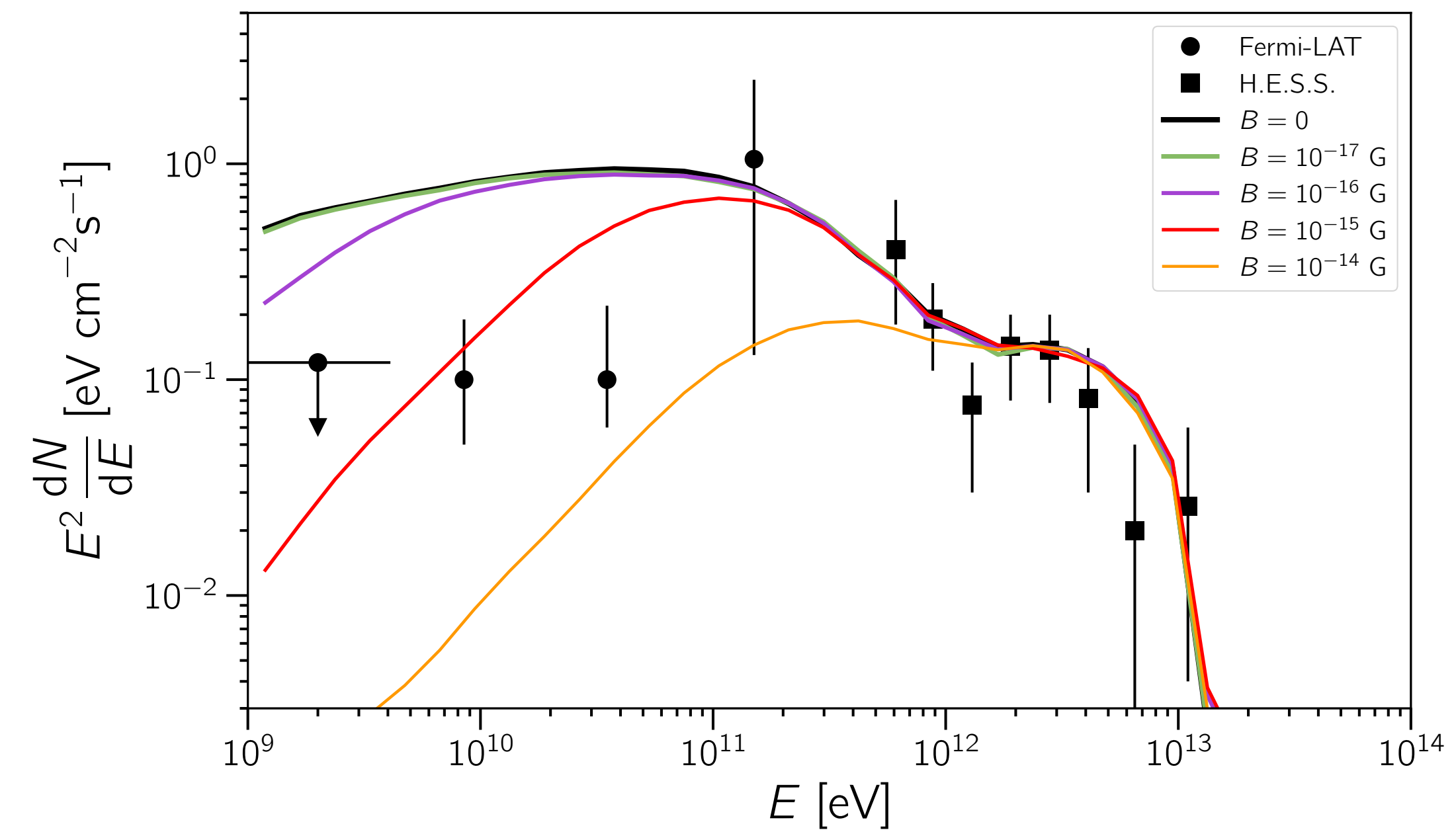
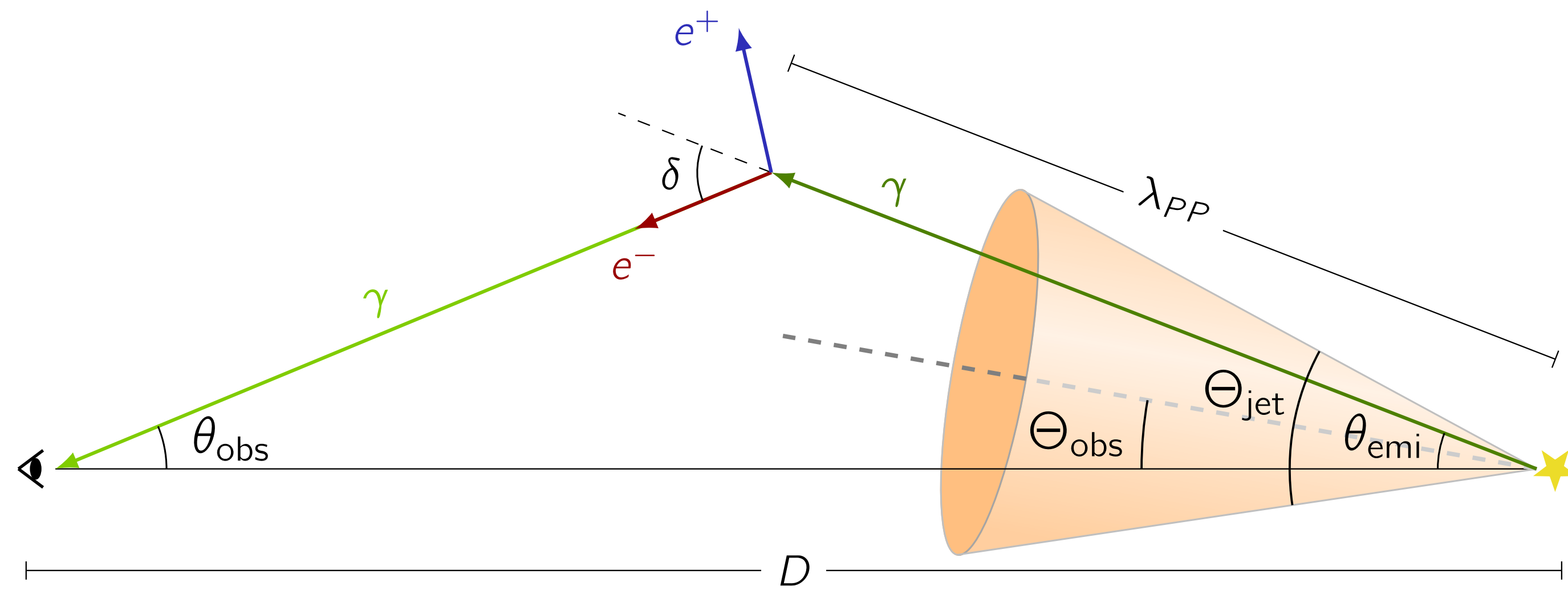
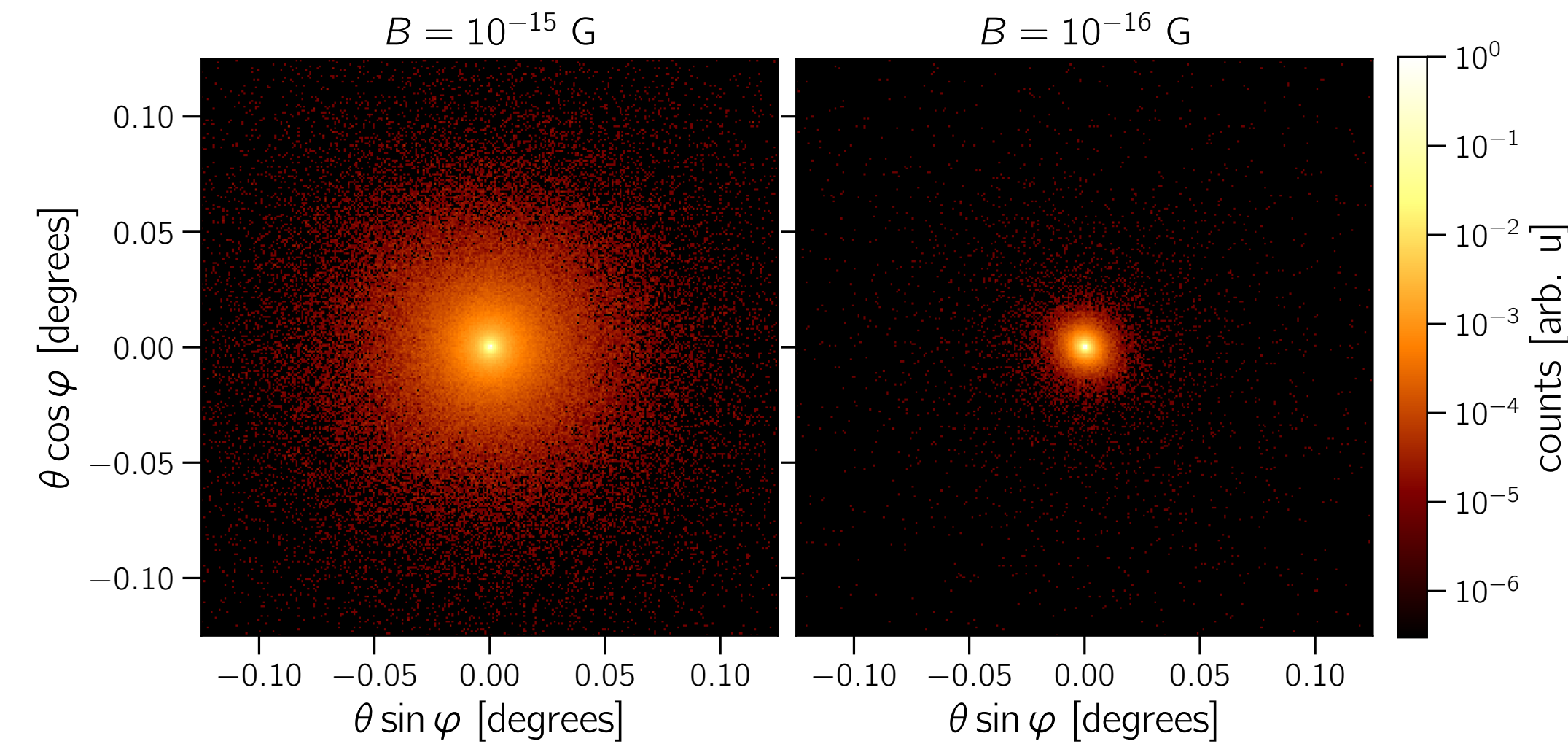
intergalactic magnetic fields: constraints



constraining IGMFs with gamma rays

► strategies

- ◆ point-like sources will appear extended ("haloes")
- ◆ time delays from transient sources ("echoes")
- ◆ spectral suppression at lower energies



constraining IGMFs with UHECRs

