

Effects of Galactic magnetic field on the UHECR anisotropy studies

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Introduction

UHECR anisotropy

- TA hotspot
- Auger warm spot...
- possible candidates: SBGs, AGNs...?

Parameter estimation

- separation angular scale θ
- anisotropic fraction f_{ani}
- $\theta=12.9$ deg, $f_{ani}=9.7\%$ with SBGs

(Auger 2018)

Galactic magnetic field (GMF)

- effects of GMF on UHECRs are not negligible! (>10 deg with 60EeV proton)

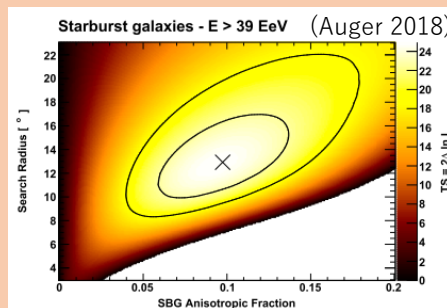
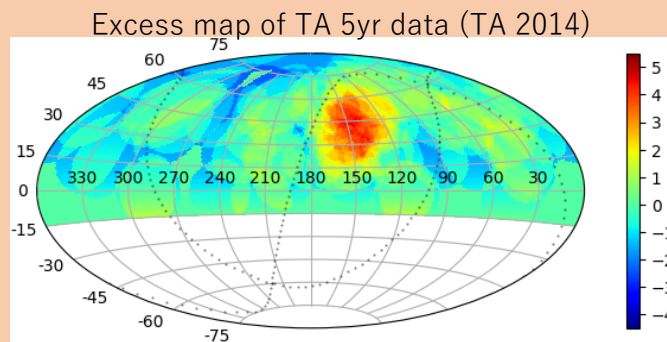
Method

Backtracking of anti-particle

- inverse calculation from the earth

Tool: CRPropa 3

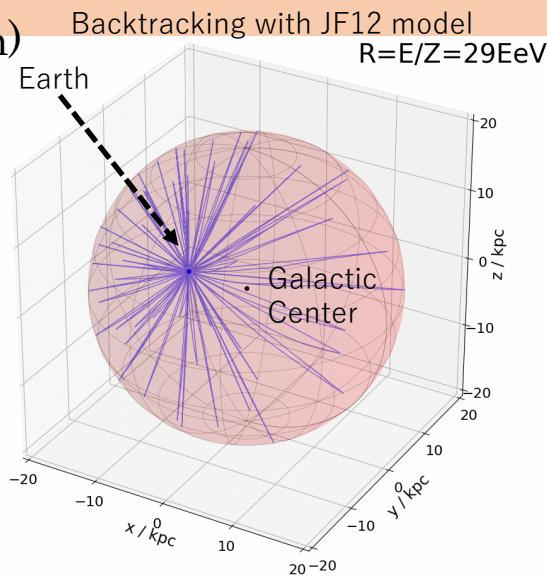
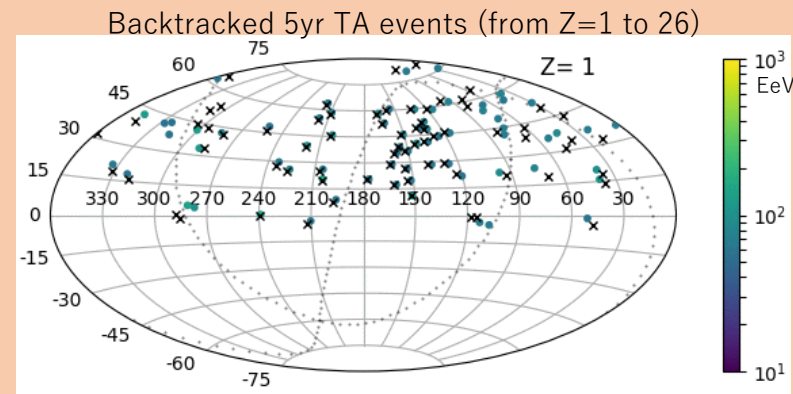
- software for UHECR propagation
- GMF Model: Jansson&Farrar 2012



Results: pure proton assumption

Parameter estimation with backtracked events

- TA data: Small deflection around TA hotspot
- Auger data: Only -2% difference in f_{ani}



Next step: Mixed mass composition

- event-by-event backtracking is not feasible
- we do not know event-by-event mass.

→ Convoluting

- GMF
- mass composition
- energy spectrum
- into CR flux pattern
- forward-tracking
- effects of GMF with mixed mass composition

