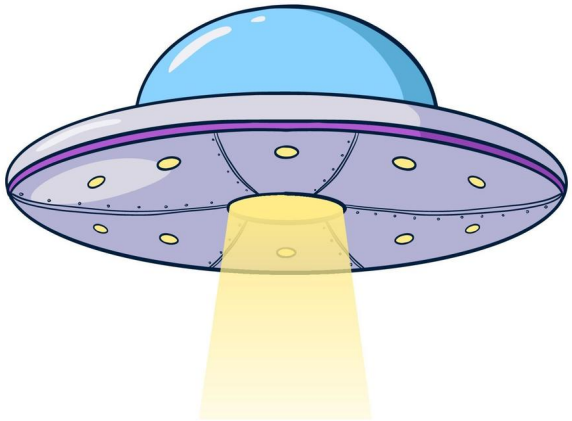
NTNU
Norwegian University of Science and Technology

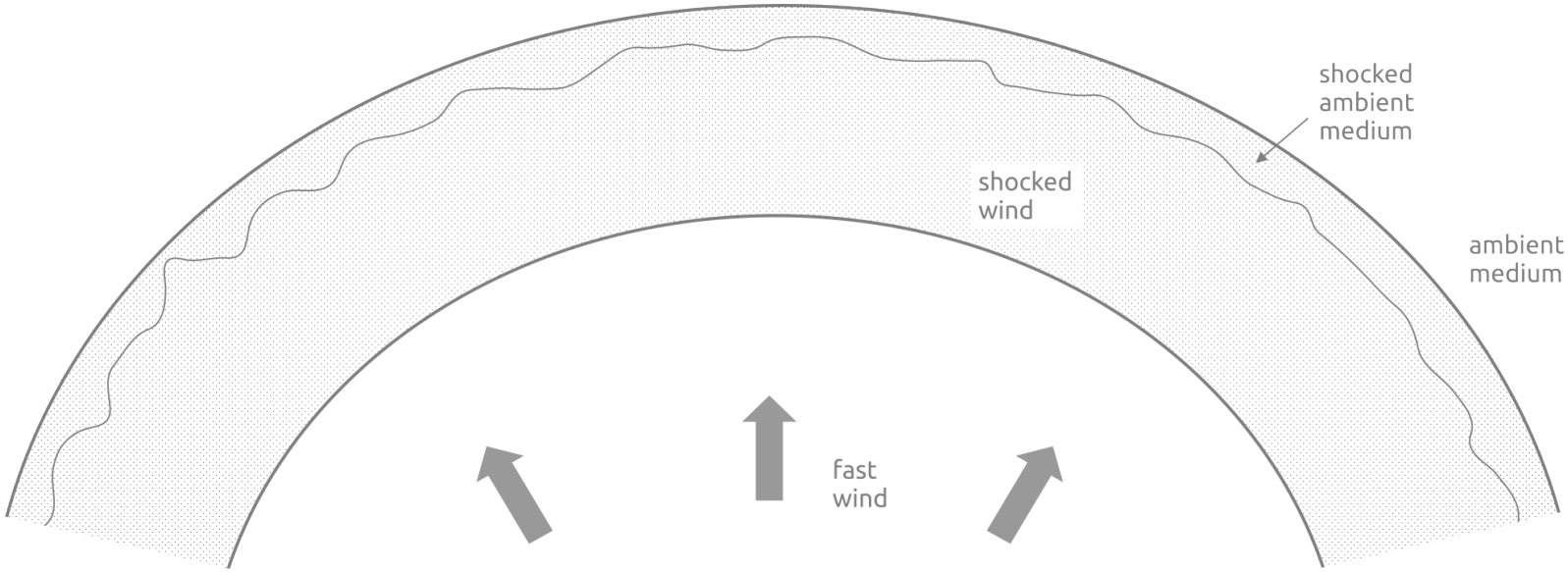
UHECR from UFOs

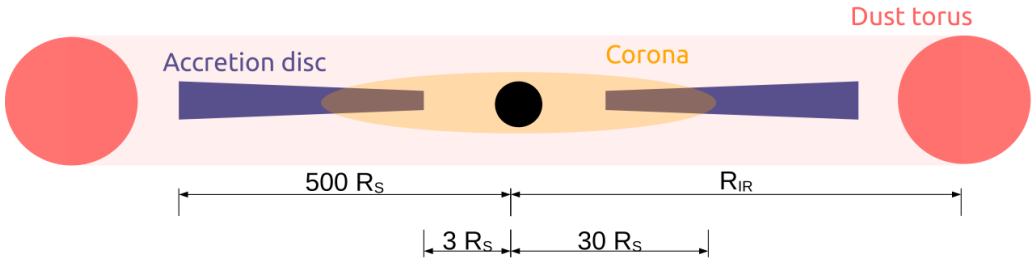


Domenik Ehlert I 09.12.2024 I Paris

UFO image: vecteezy.com/vector-art/3206967

UFO = “Ultra-Fast Outflow” (from AGN)

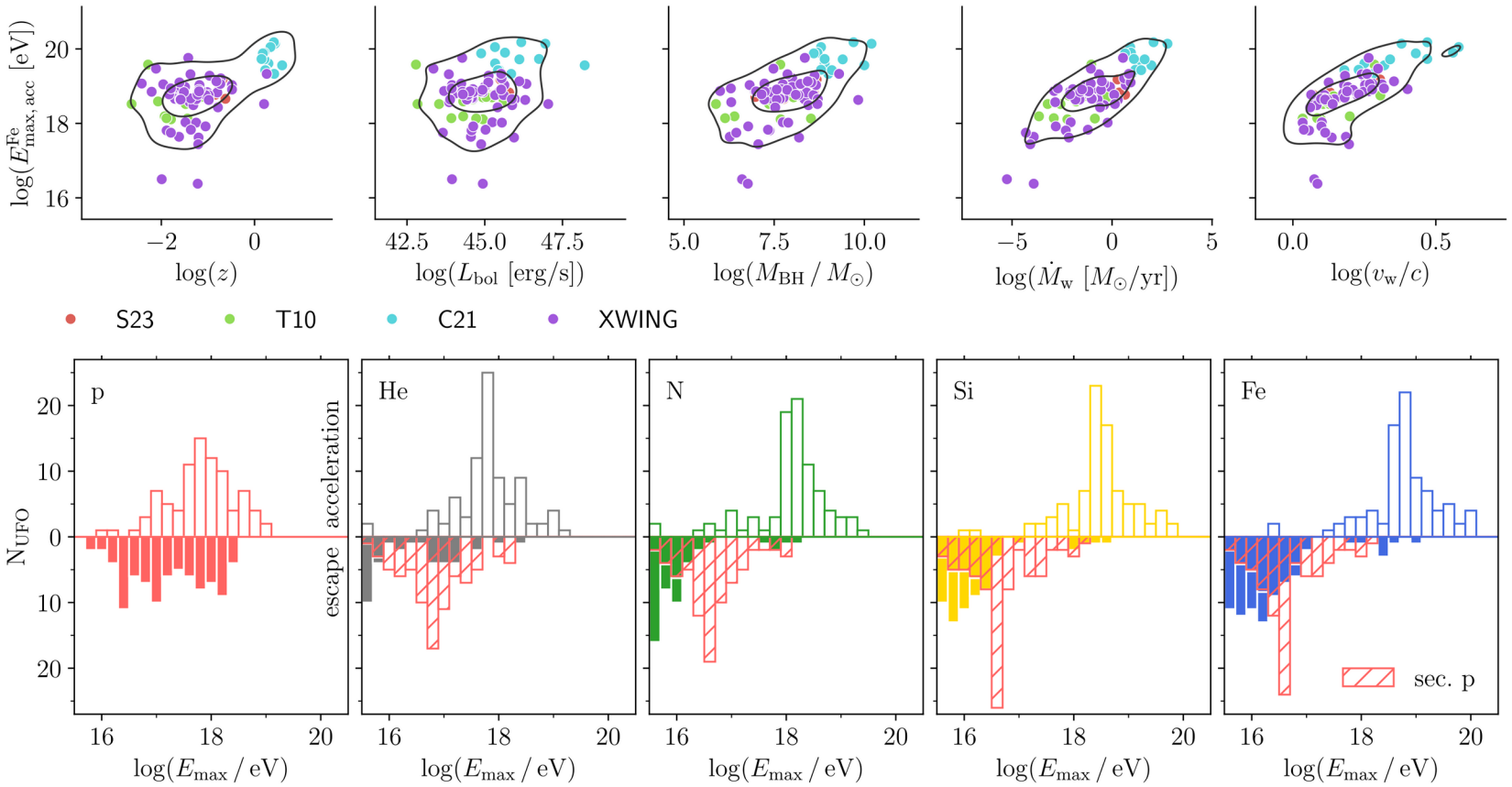




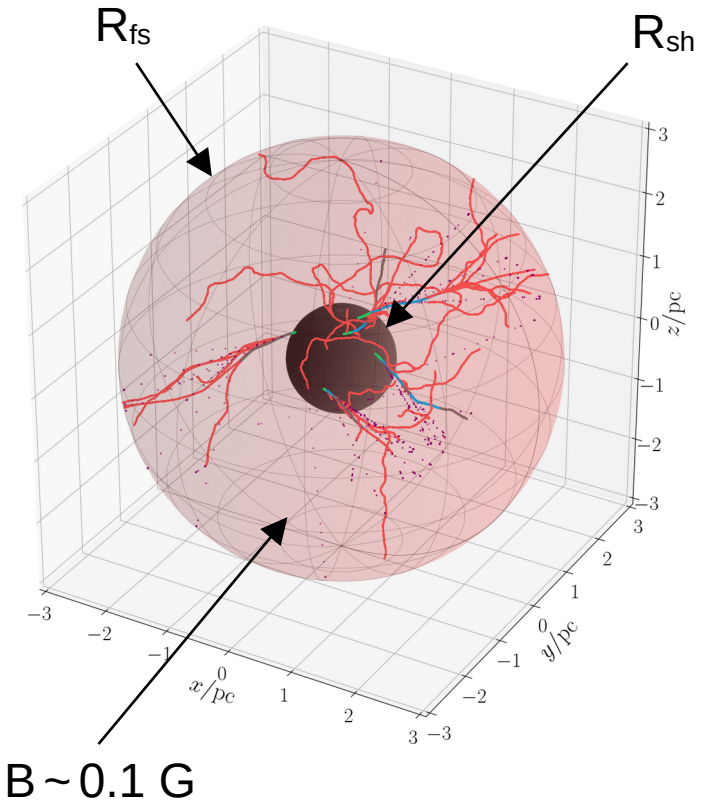
- wind bubble
- in 50% of AGN
- 0.5c; wide angle
- study 87 UFOs

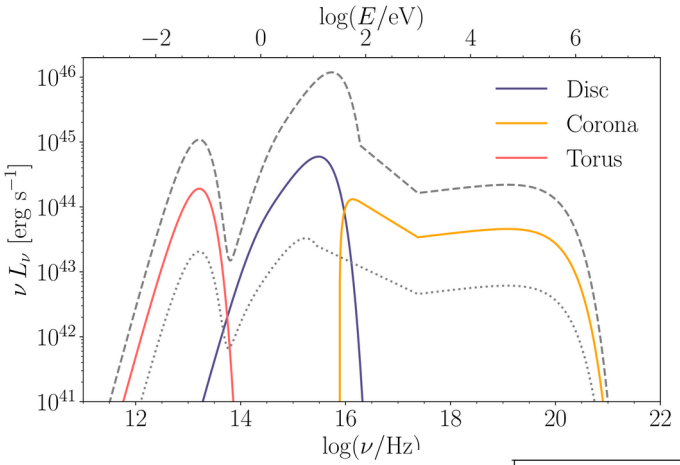
Maximum Energy of the Cosmic Rays

DE, F. Oikonomou, E. Peretti;
MNRAS (soon); arxiv:2411.05667



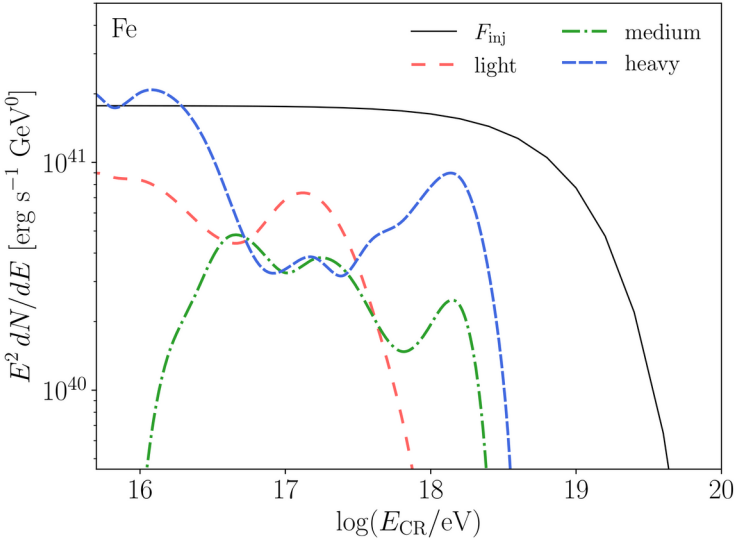
Maximum Energy of the Cosmic Rays



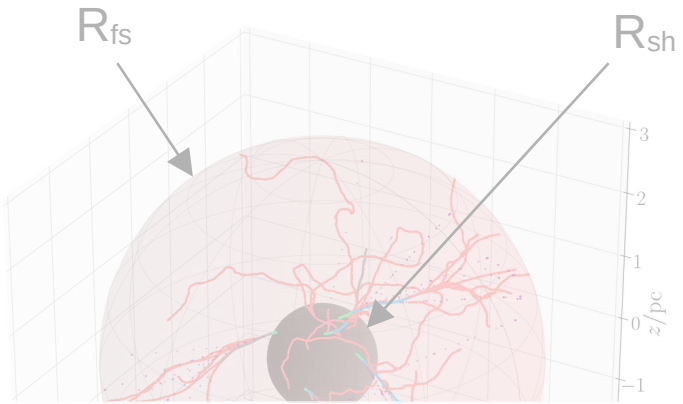


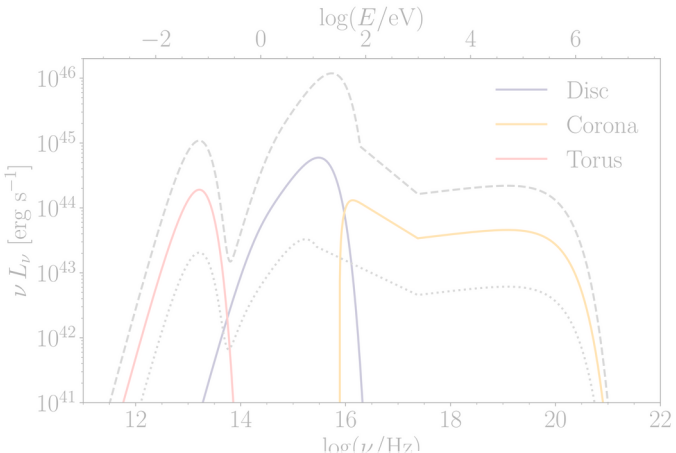
1) Strong magnetic field (mG ~ G)
2) Dense external photon fields

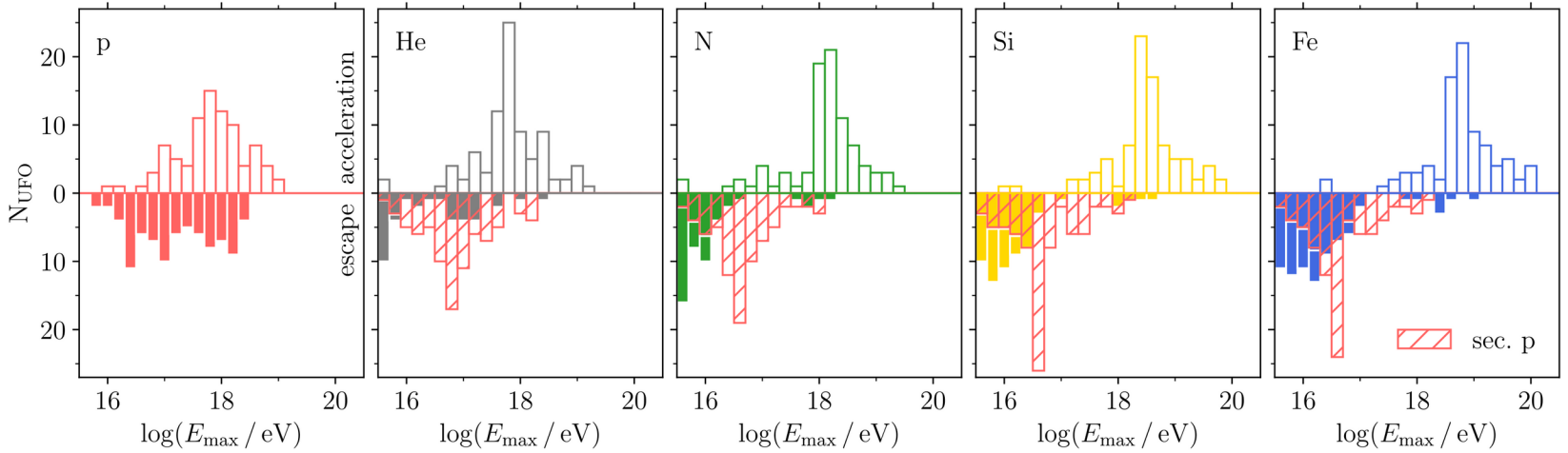
> Disintegration of CR nuclei



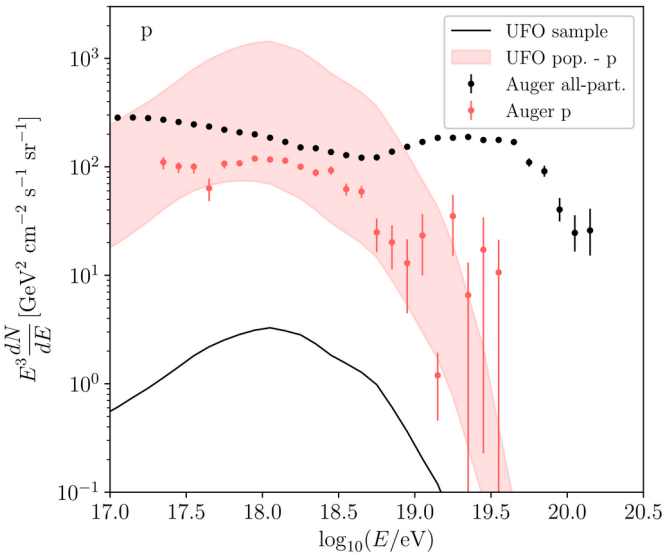
Maximum Energy of the Cosmic Rays

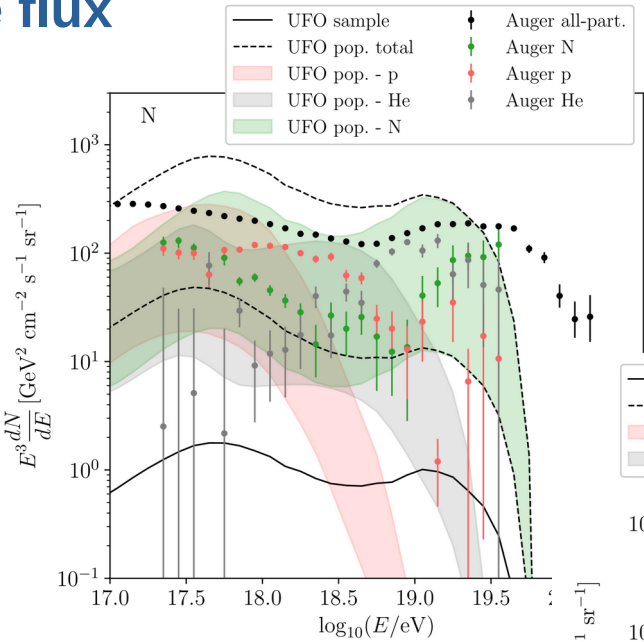


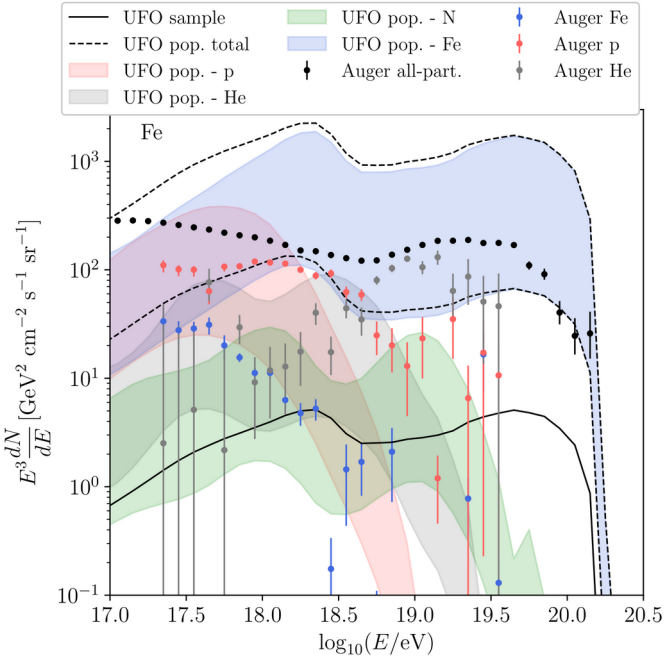




Contribution to the diffuse flux

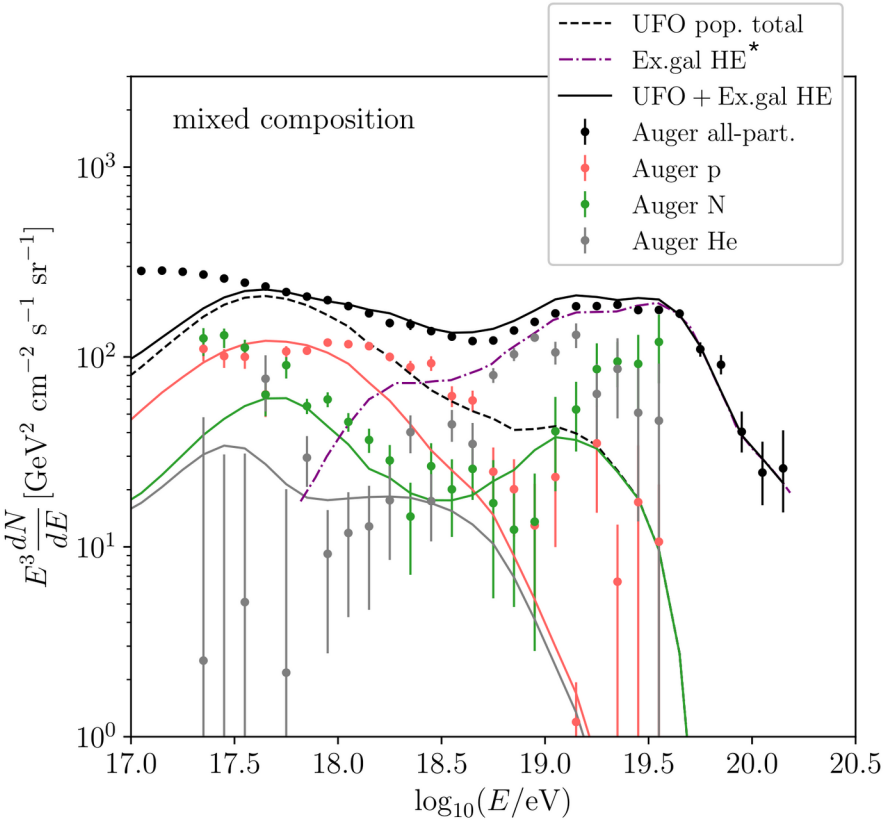






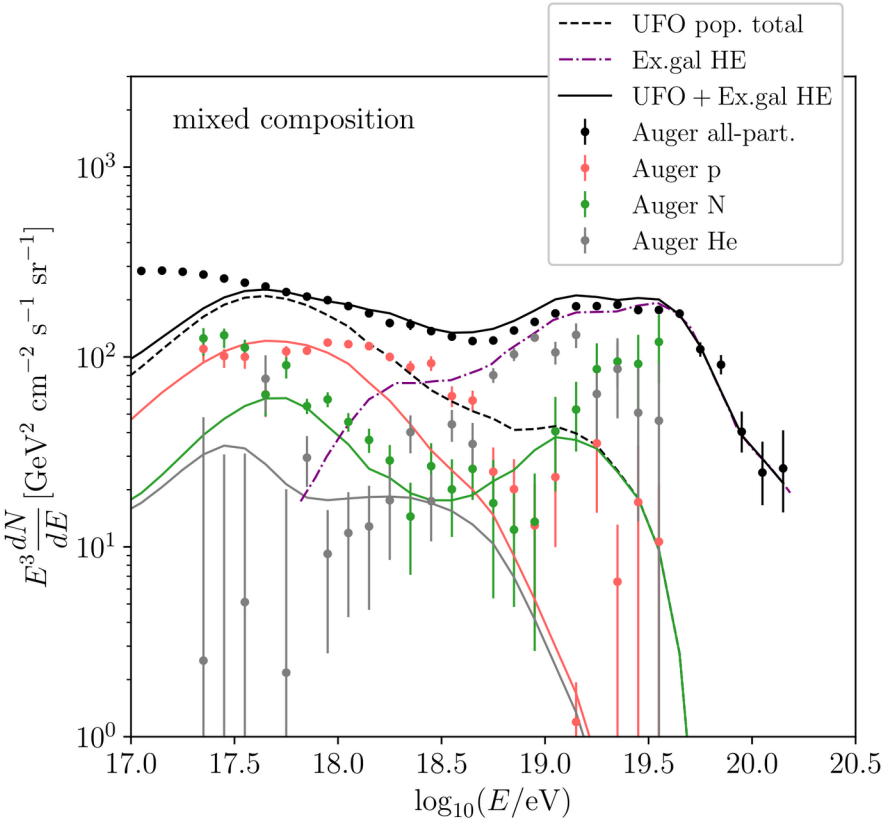
Extrapolate to total UFO population (~50% of AGN)

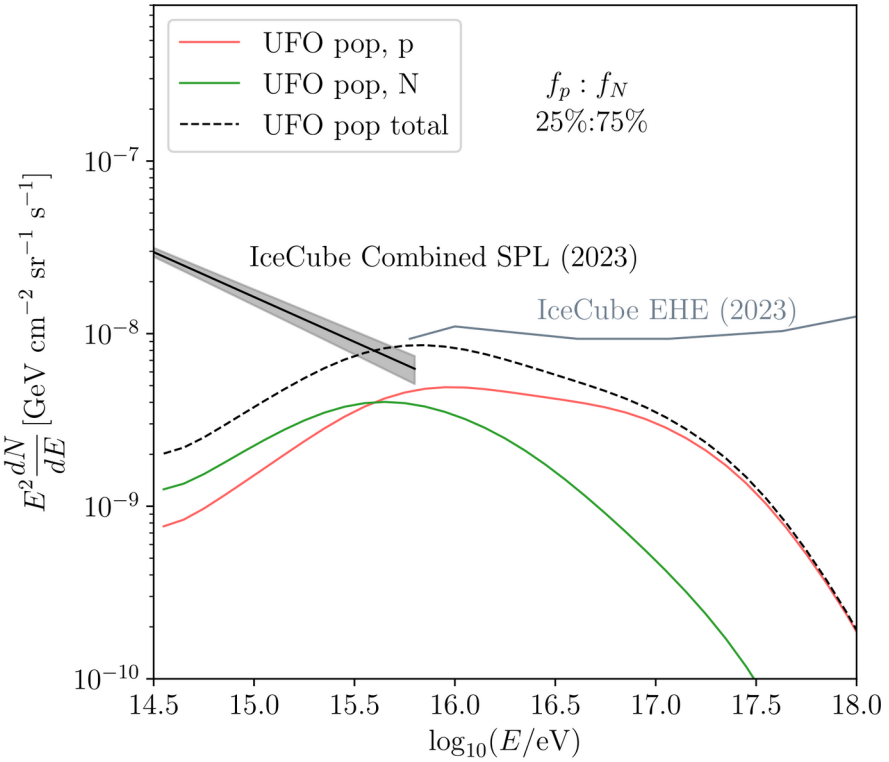
Contribution to the diffuse flux



* Pierre Auger Collab.
JCAP 05 (2023) 024

Contribution to the diffuse flux





Conclusions:

1) promising source of sub-ankle flux
2) potentially also significant contribution above the ankle

see arXiv:2411.05667, MNRAS (soon)

Ultra-high-energy cosmic rays from ultra-fast outflows of active galactic nuclei

Domenik Ehlert [1]★ Foteini Oikonomou [1] Enrico Peretti [2]

[1] *Institutt for fysikk, Norwegian University of Science and Technology, Høgskoleringen 5, 7491 Trondheim, Norway*

[2] *Université Paris Cité, CNRS, Astroparticule et Cosmologie, 10 Rue Alice Domon et Léonie Duquet, 75013 Paris, France*