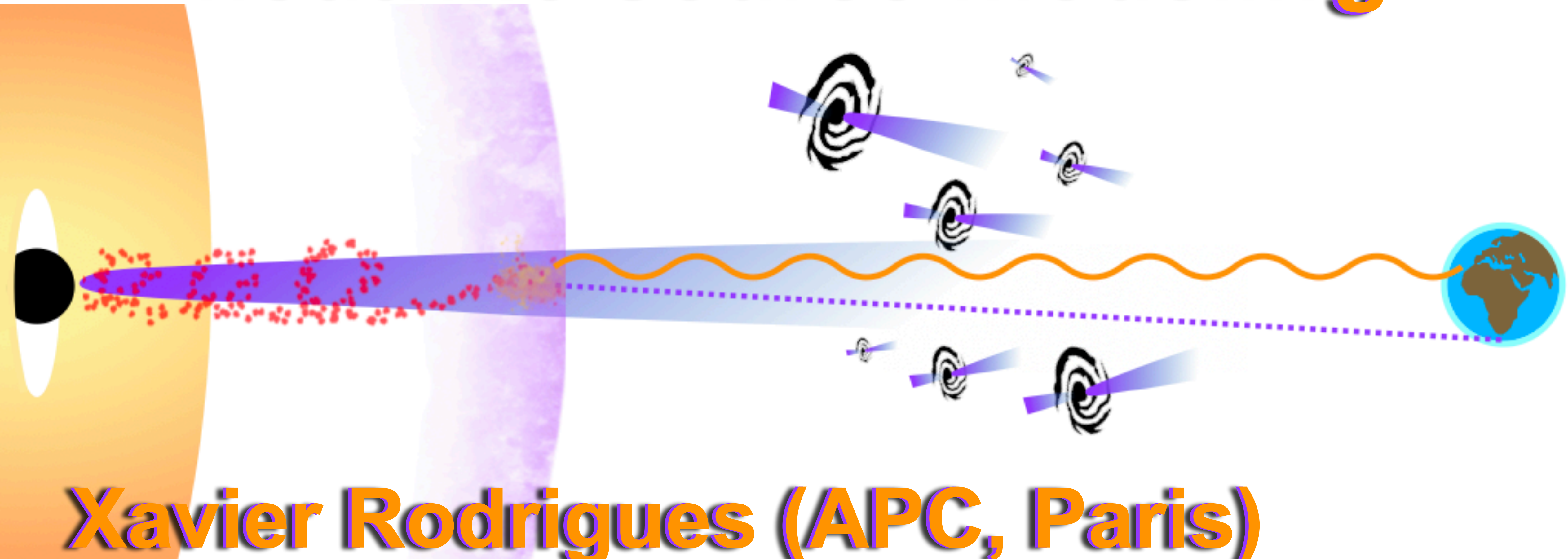
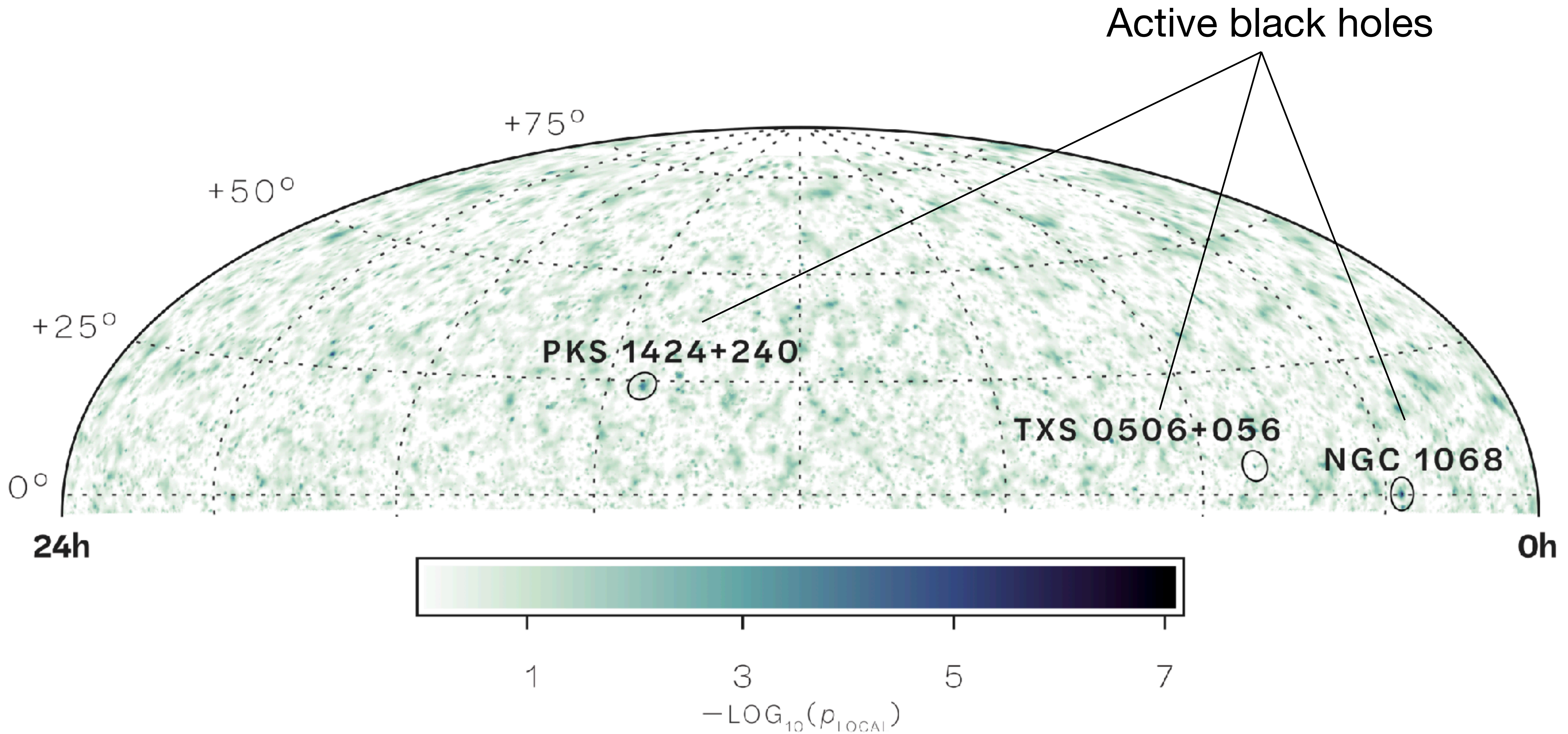


Developments and challenges in neutrino source modeling

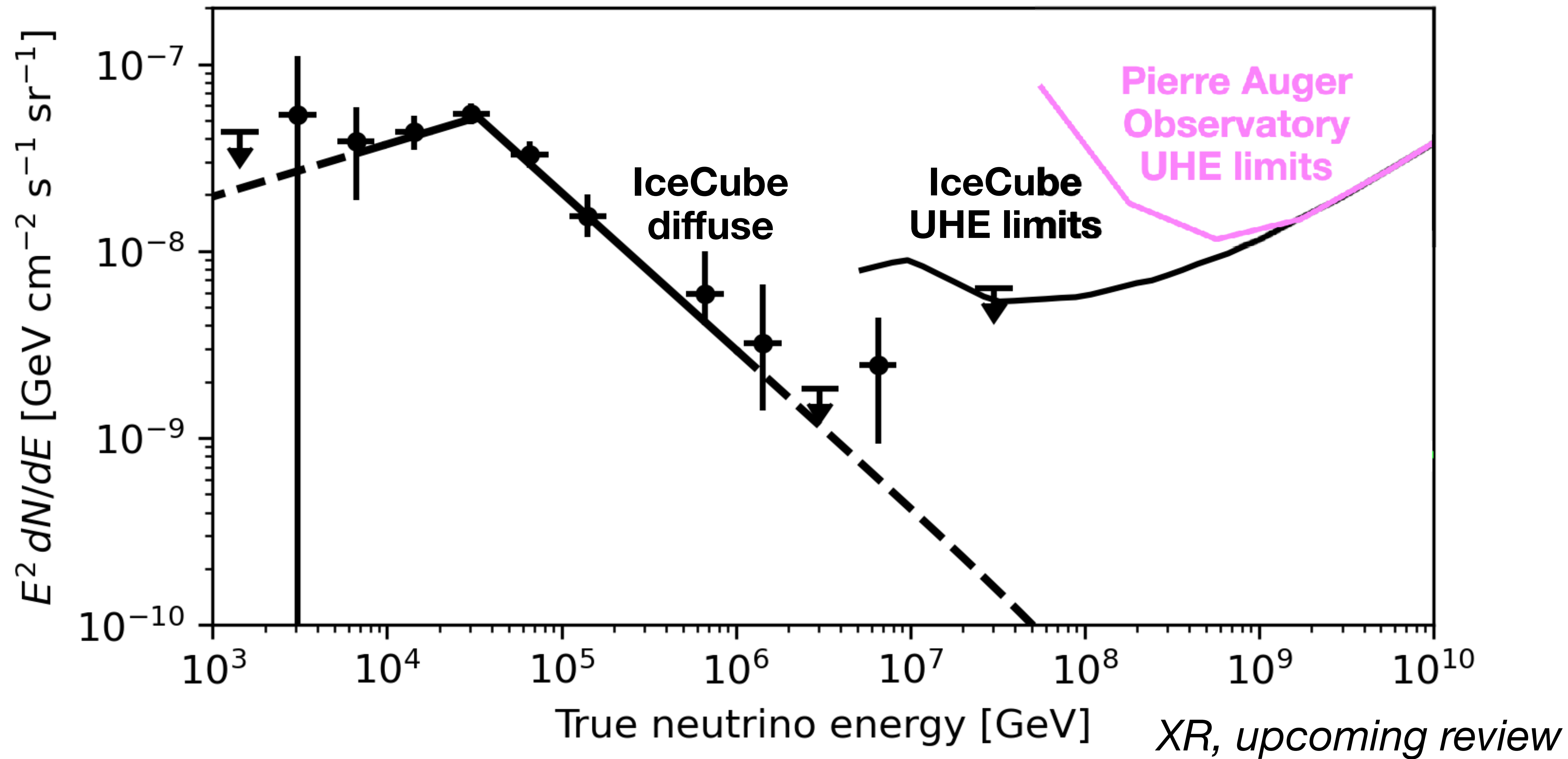


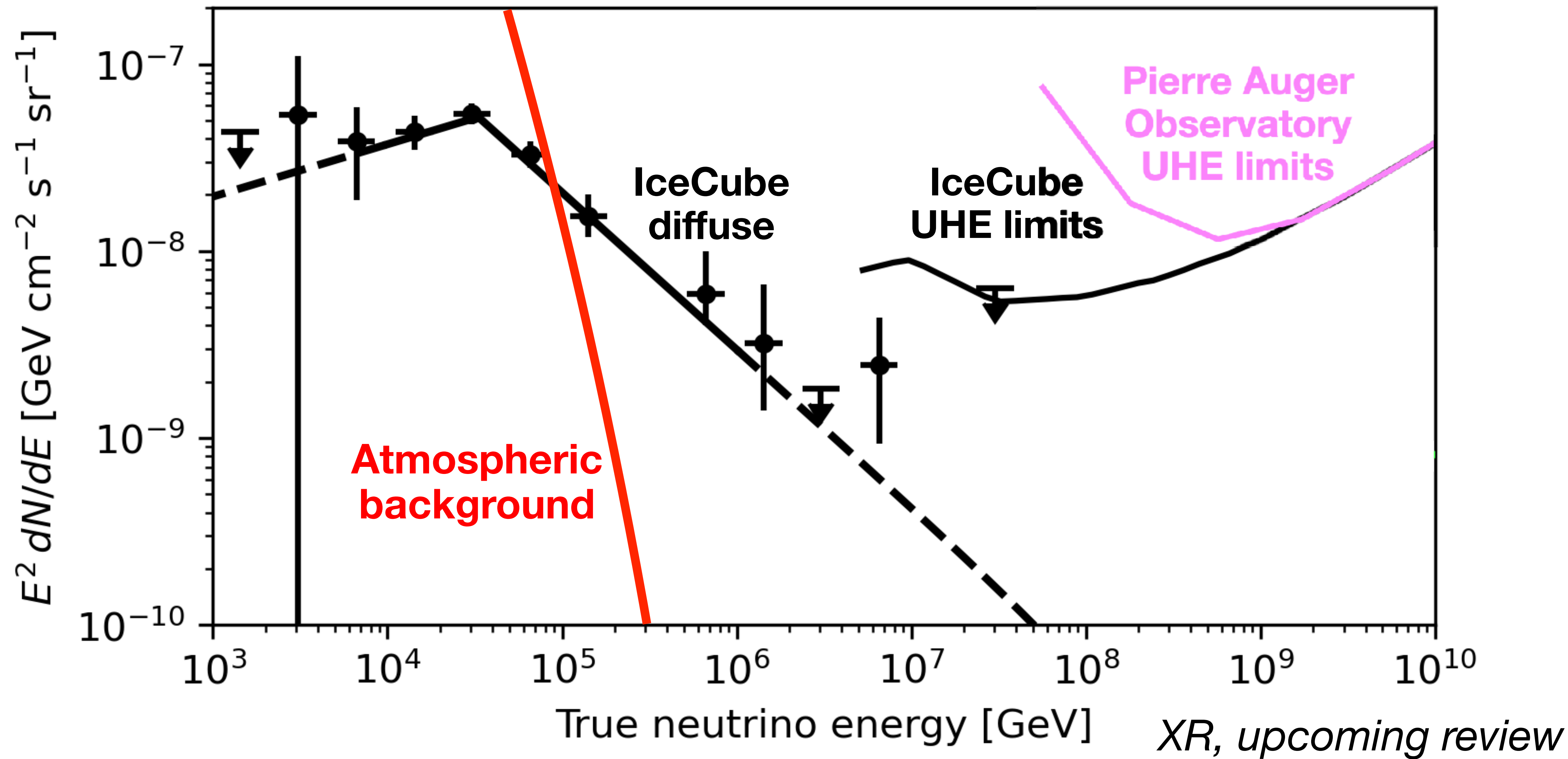
Xavier Rodrigues (APC, Paris)

BridgeQG, Annecy, 5 February 2026

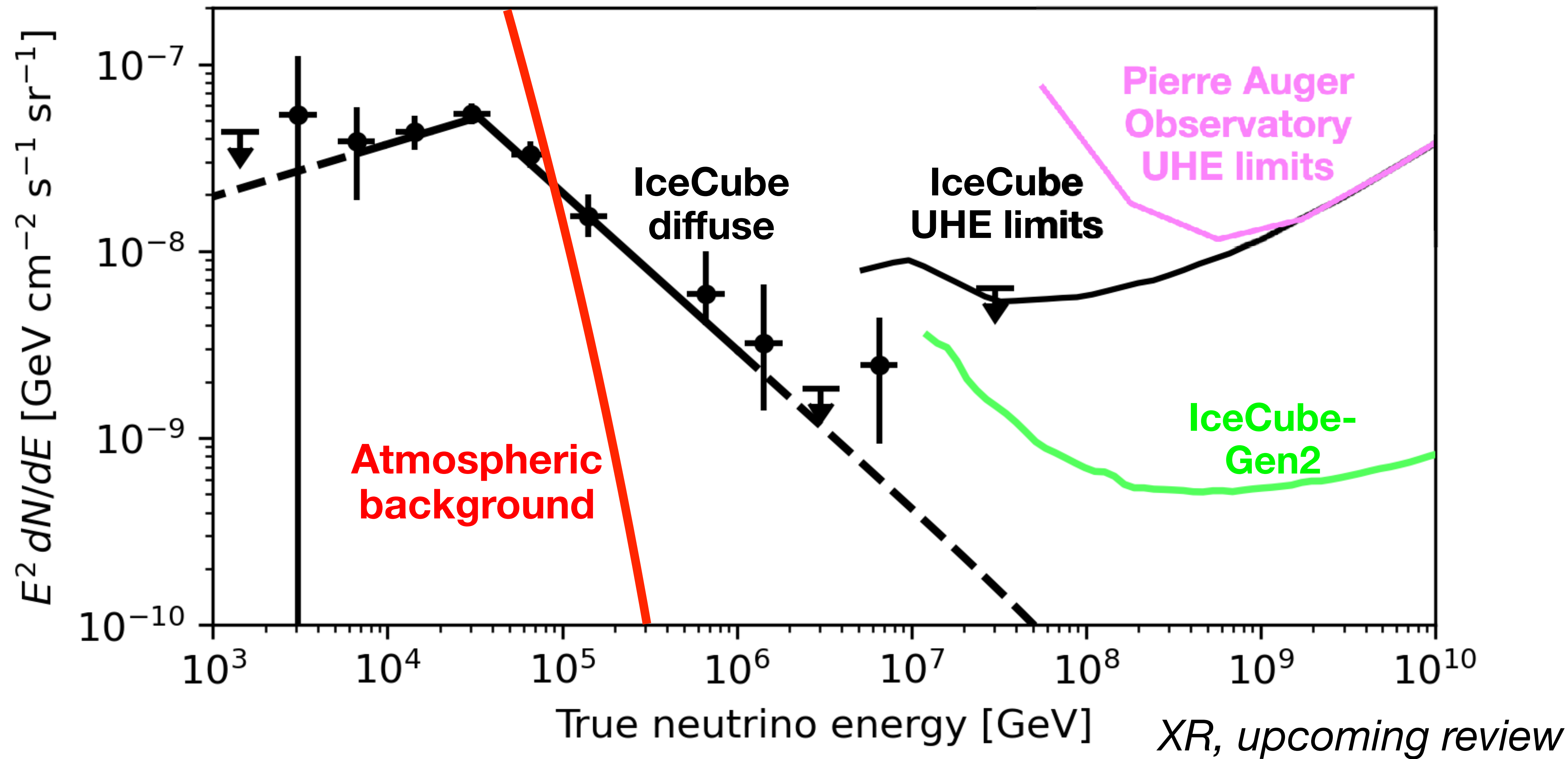


IceCube Collaboration (2022) Science 378

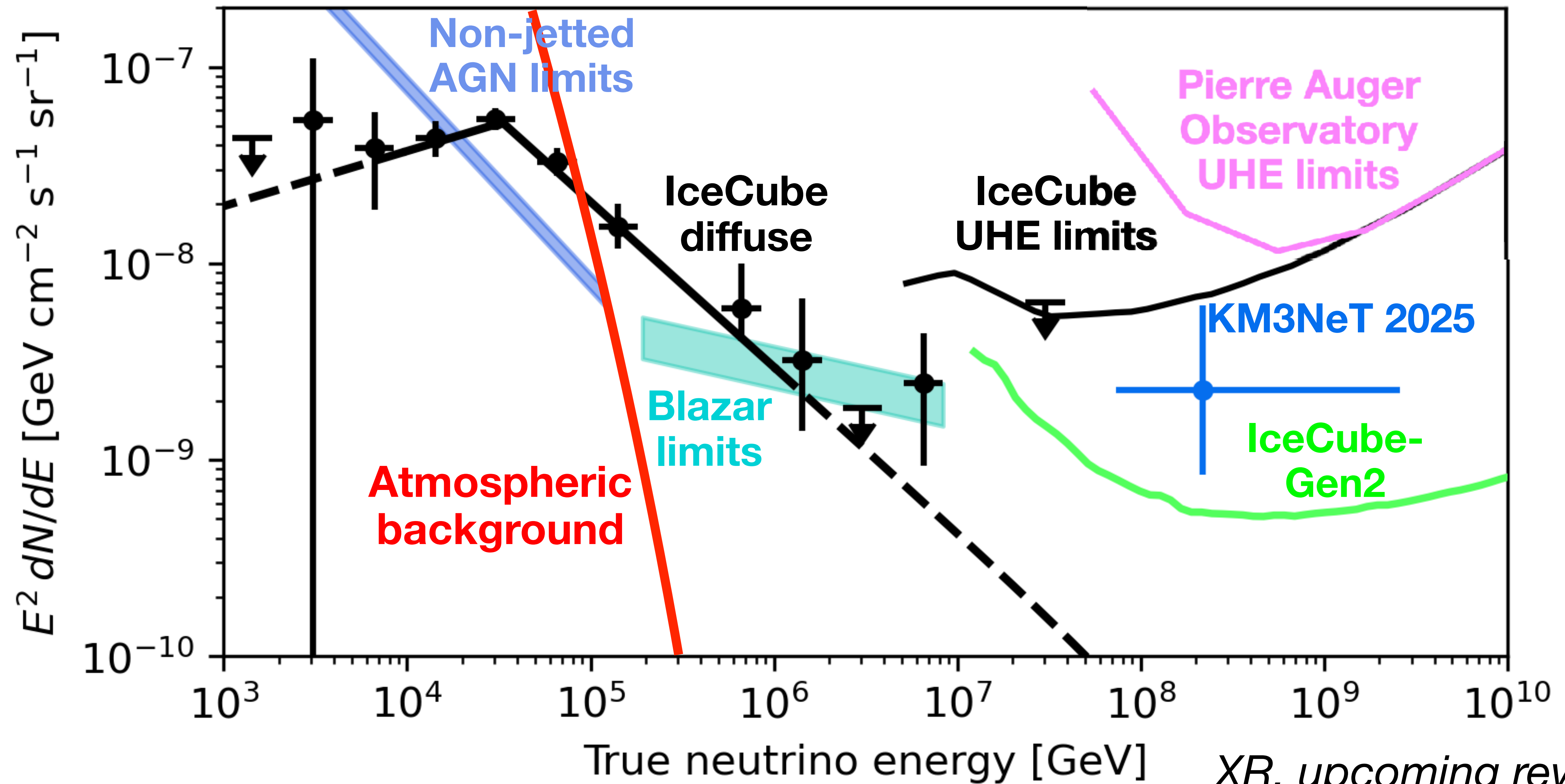




XR, upcoming review

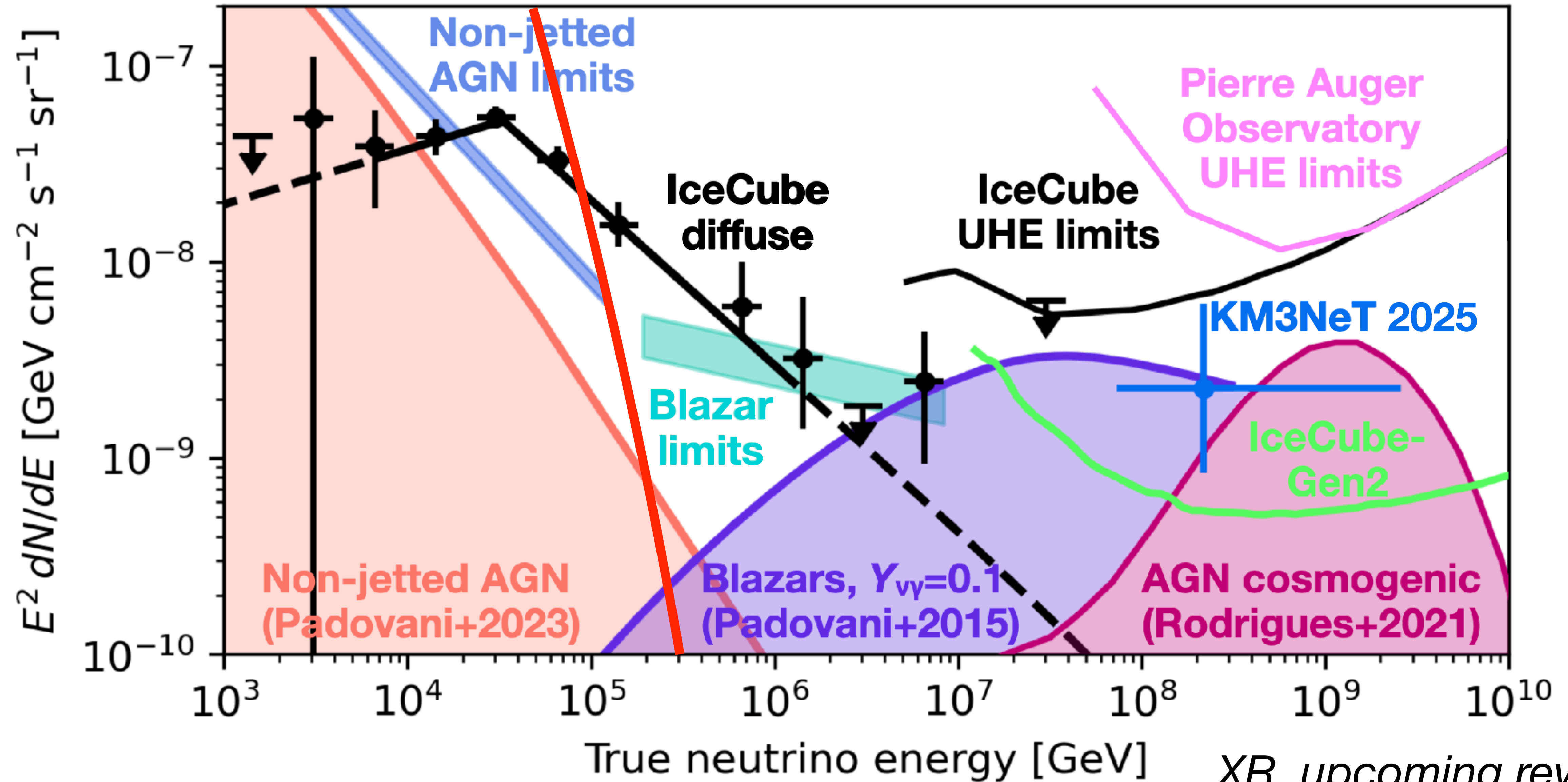


Cosmic neutrino spectrum

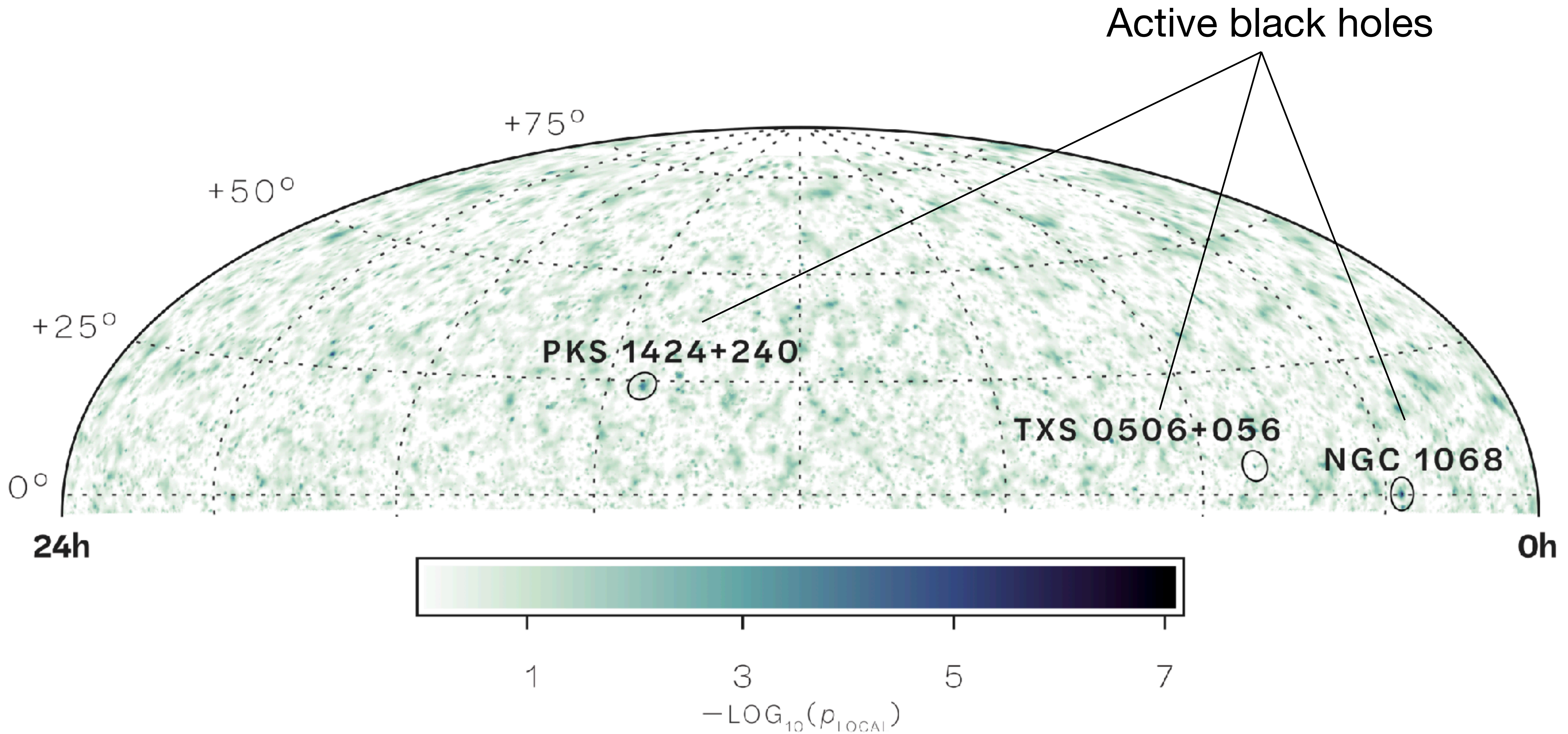


XR, upcoming review

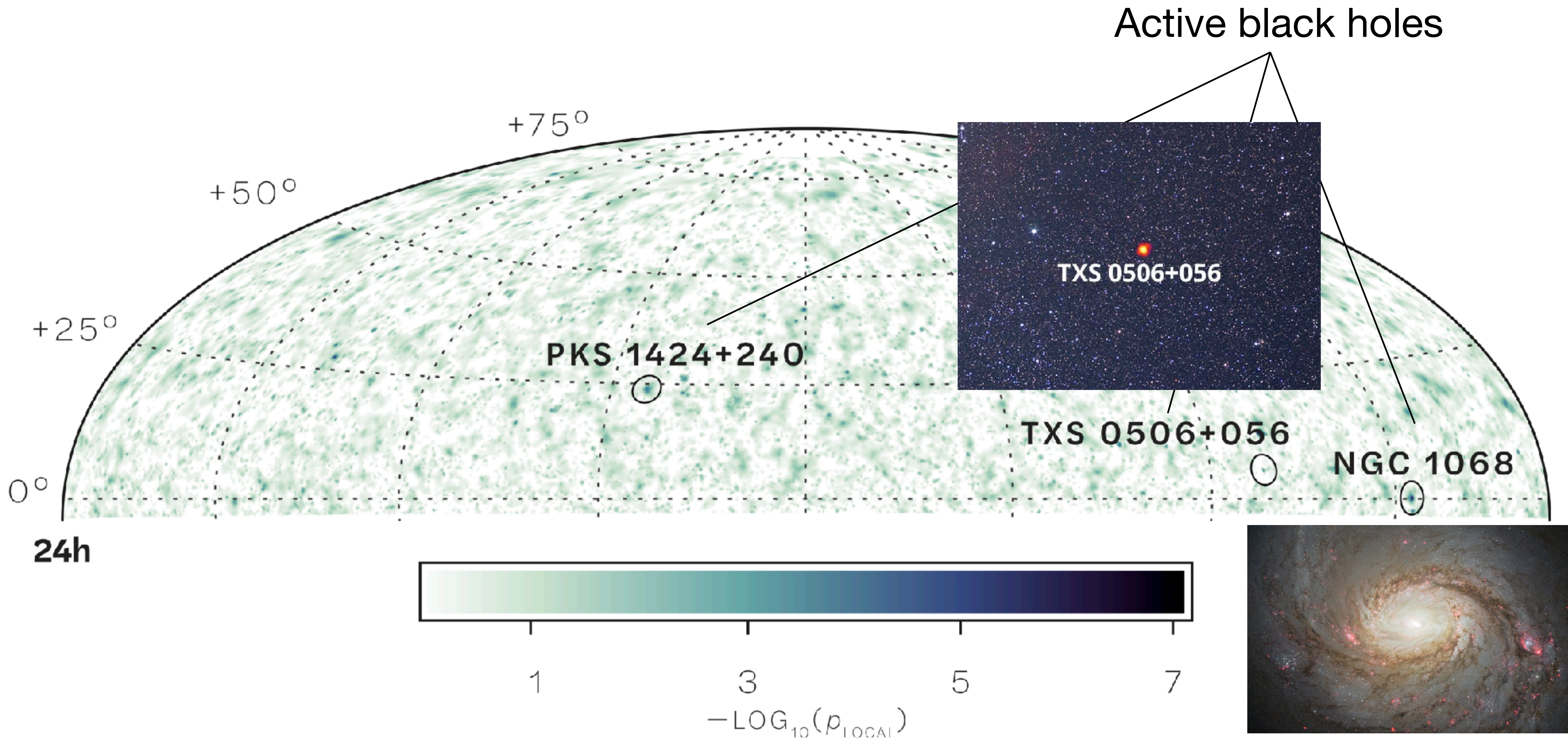
The cosmic neutrino spectrum

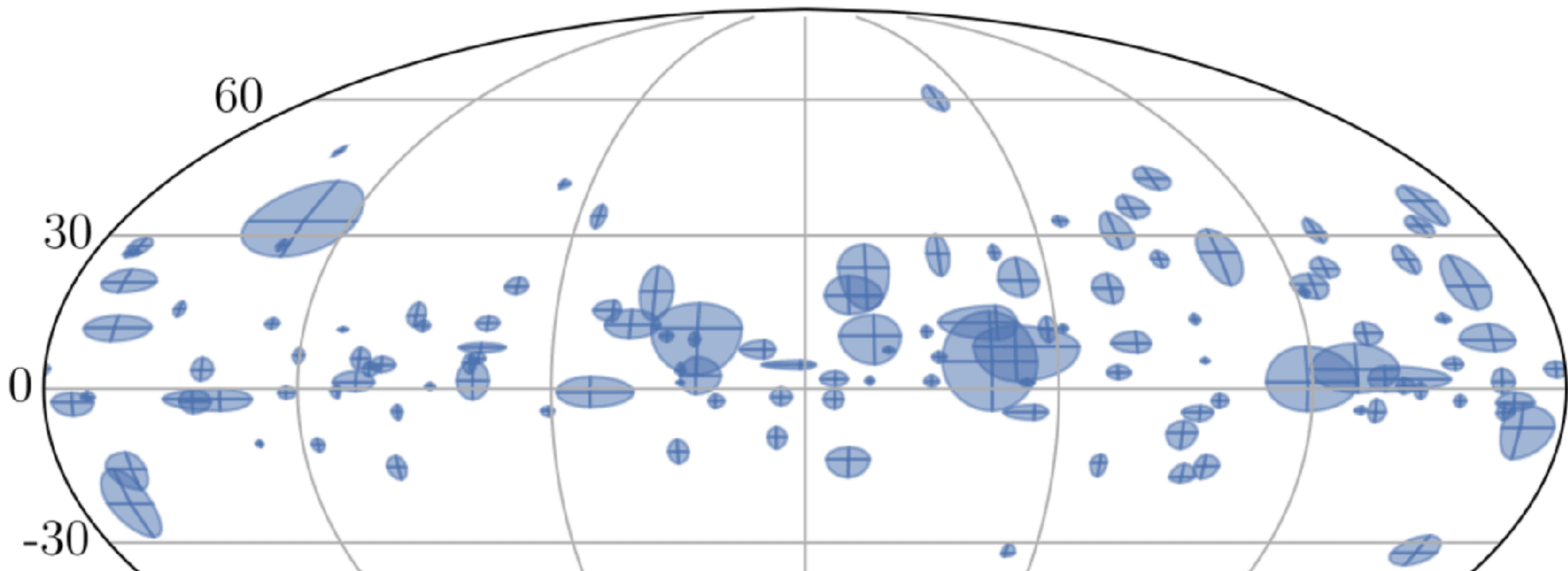


XR, upcoming review



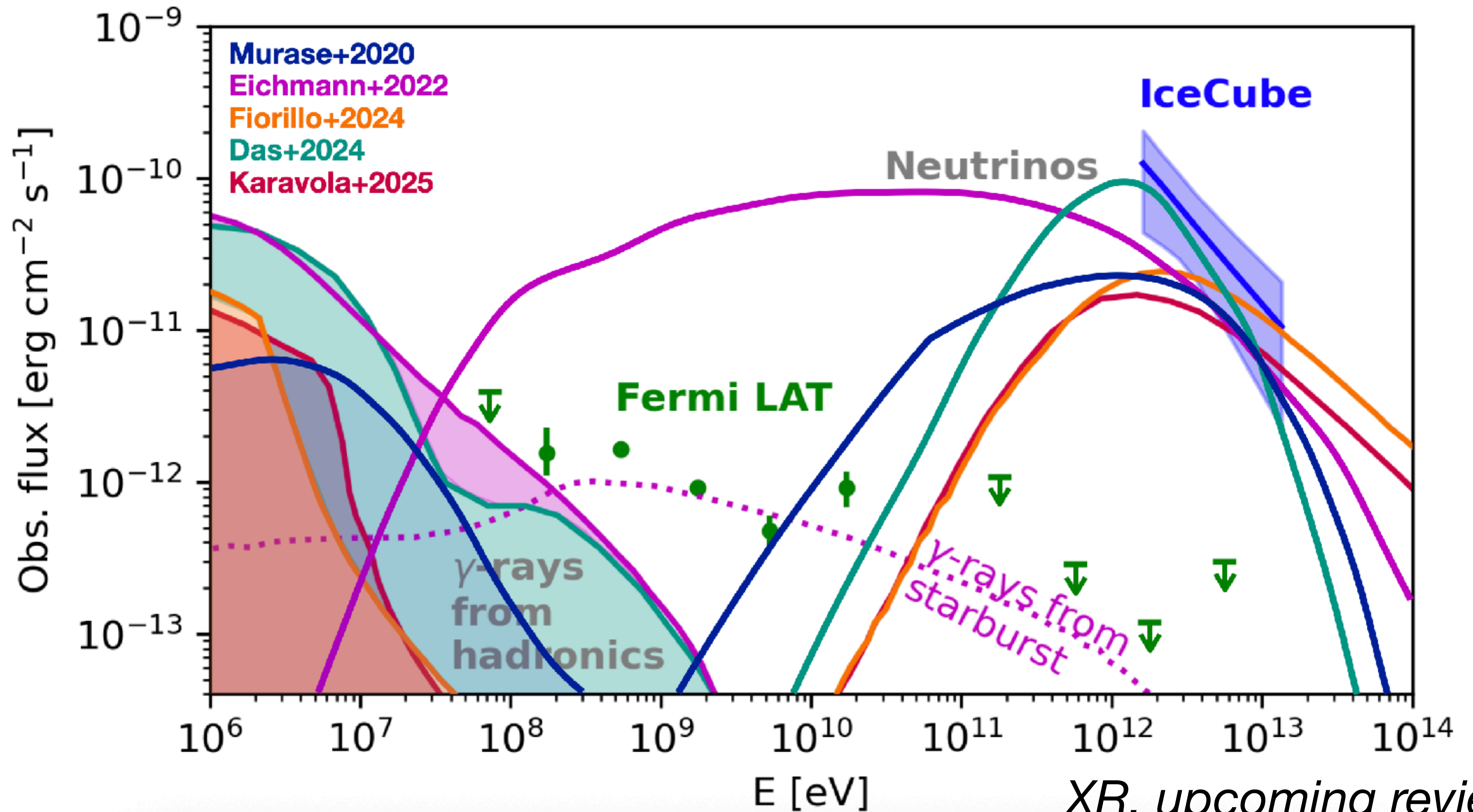
IceCube Collaboration (2022) Science 378





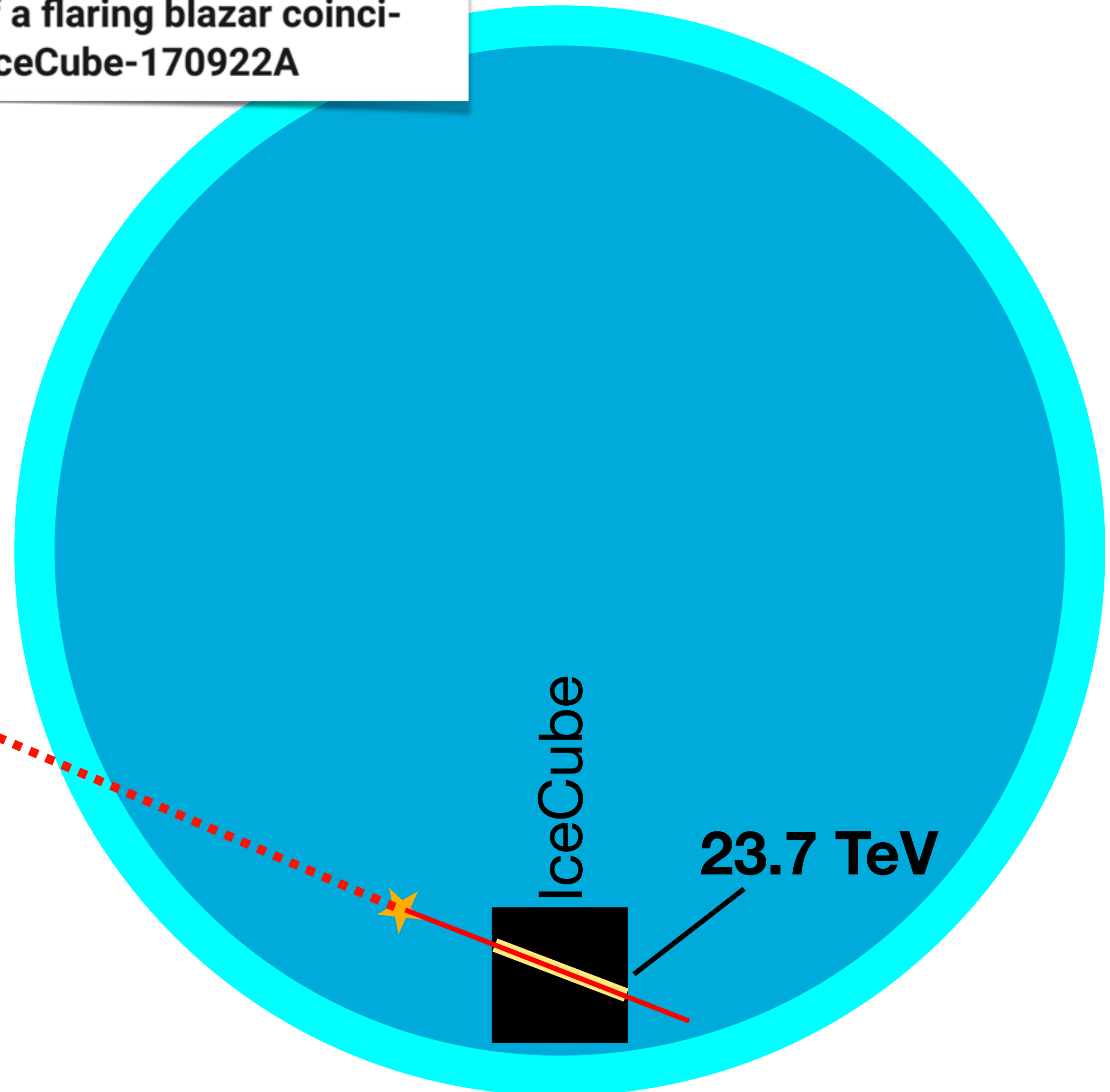
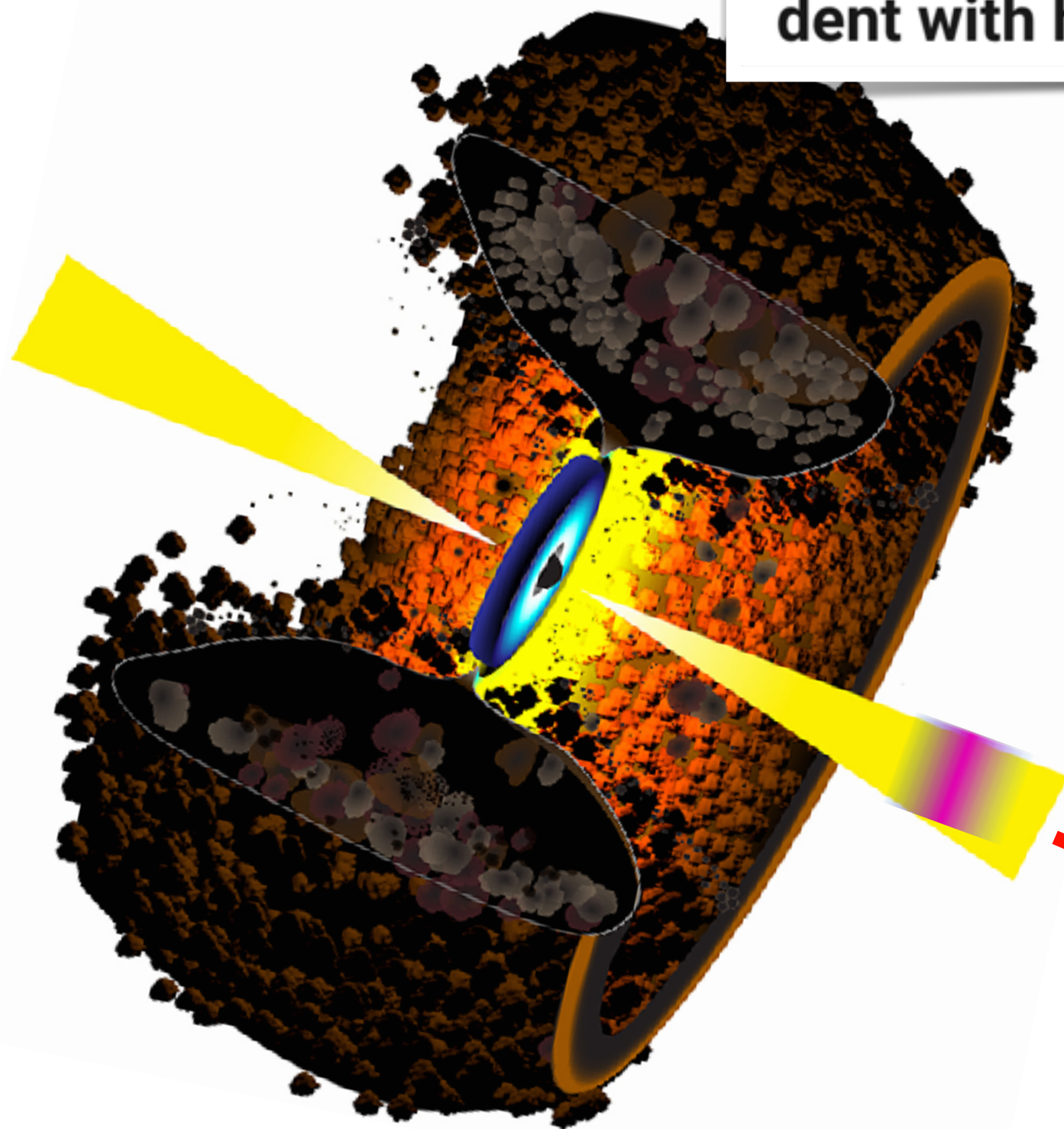
IceCube Collaboration (2022) ApJ 964

NGC 1068

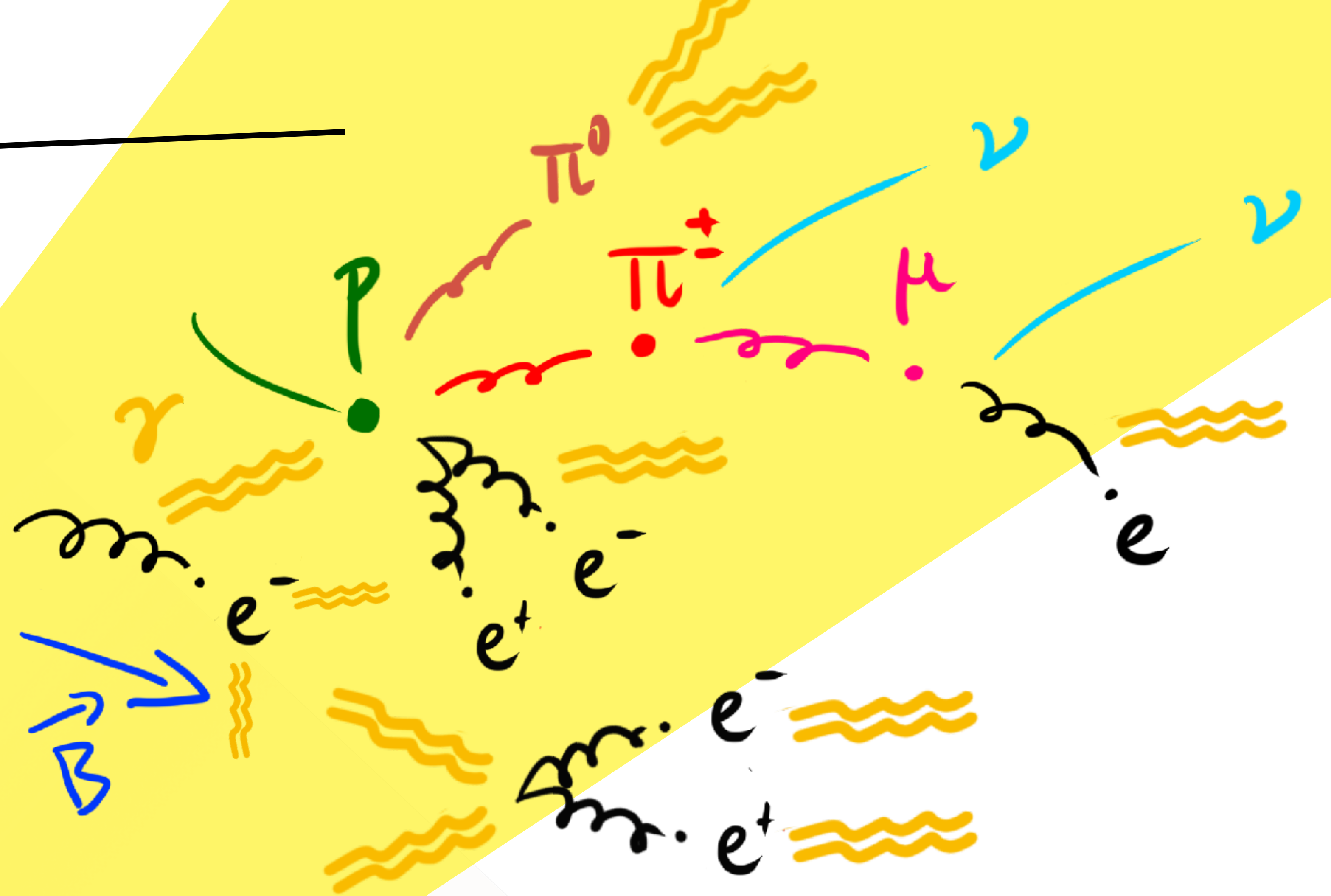
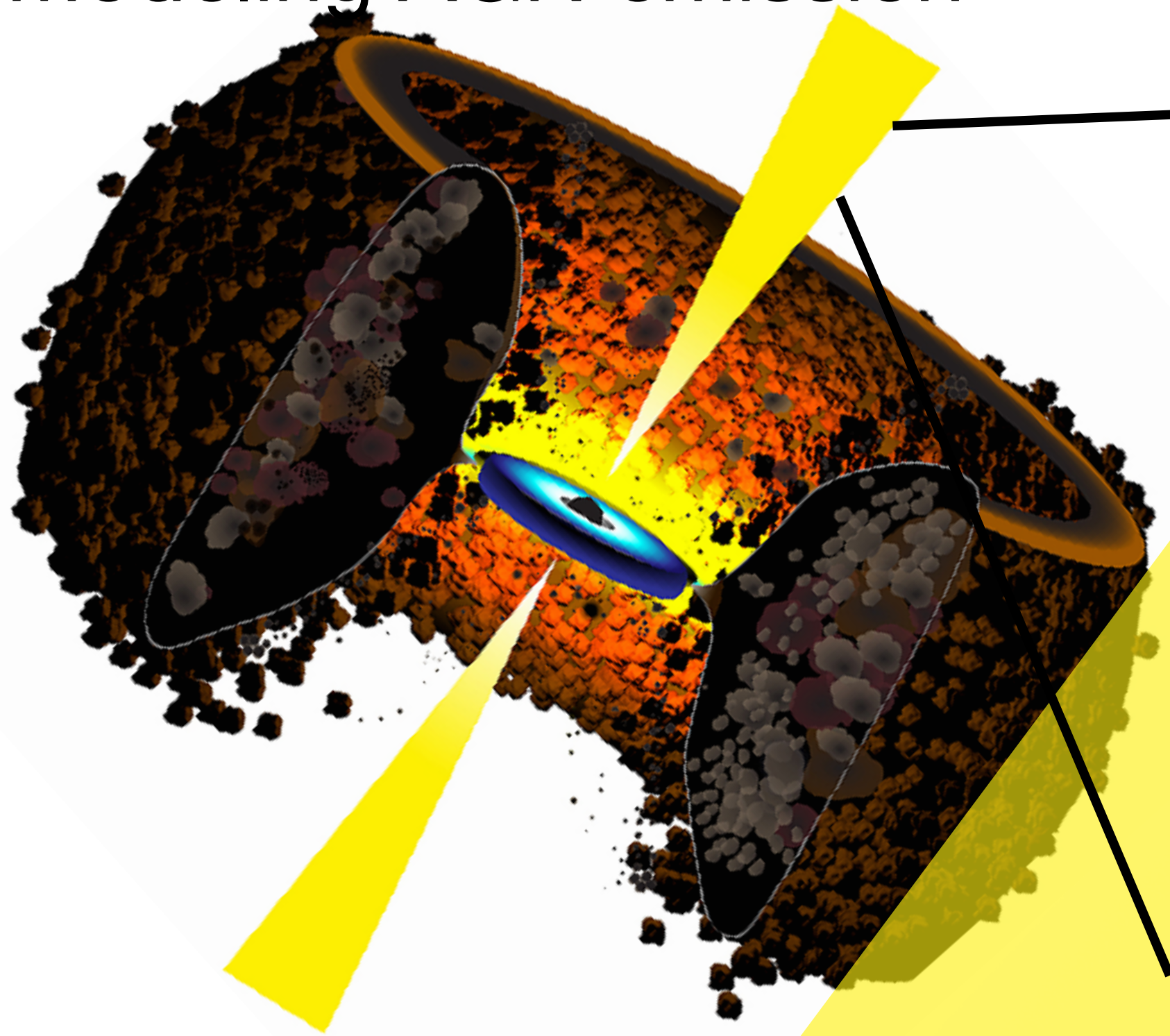


XR, upcoming review

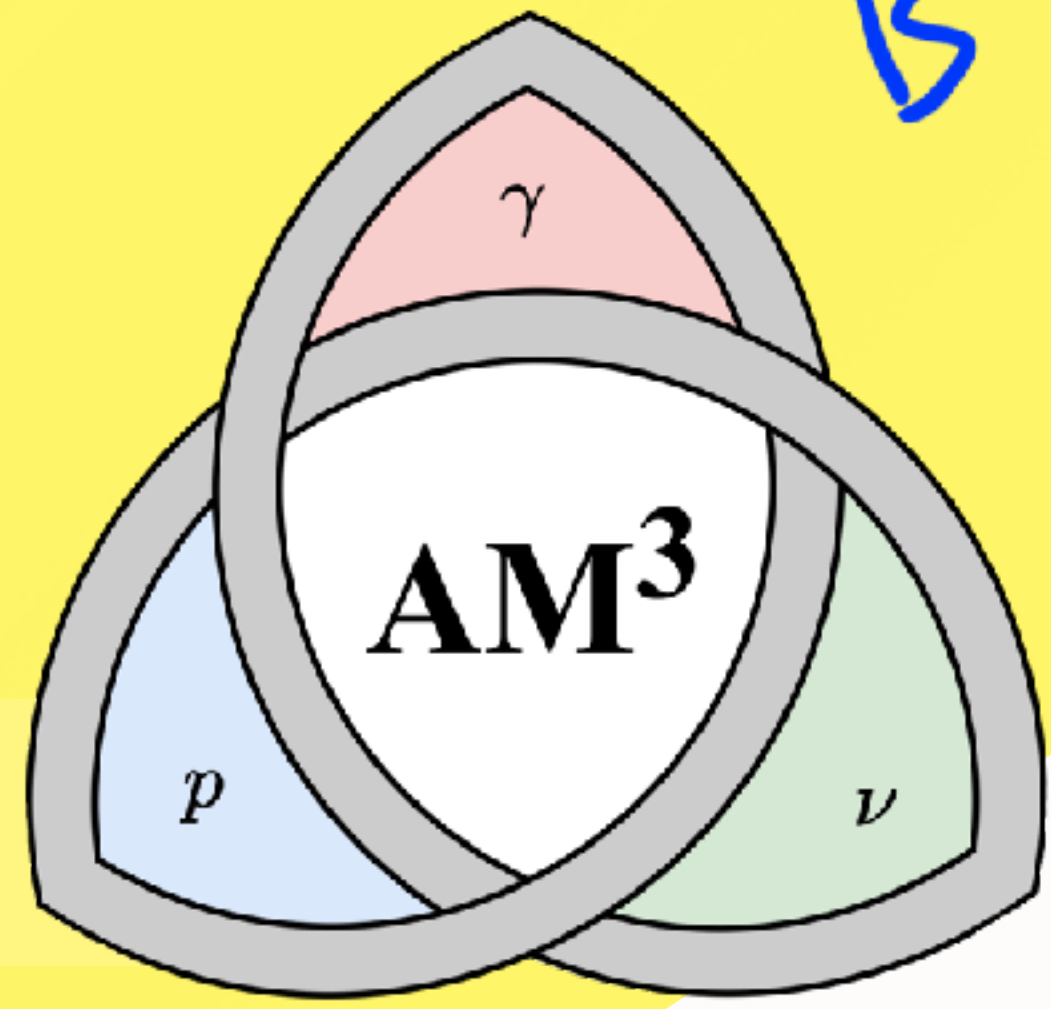
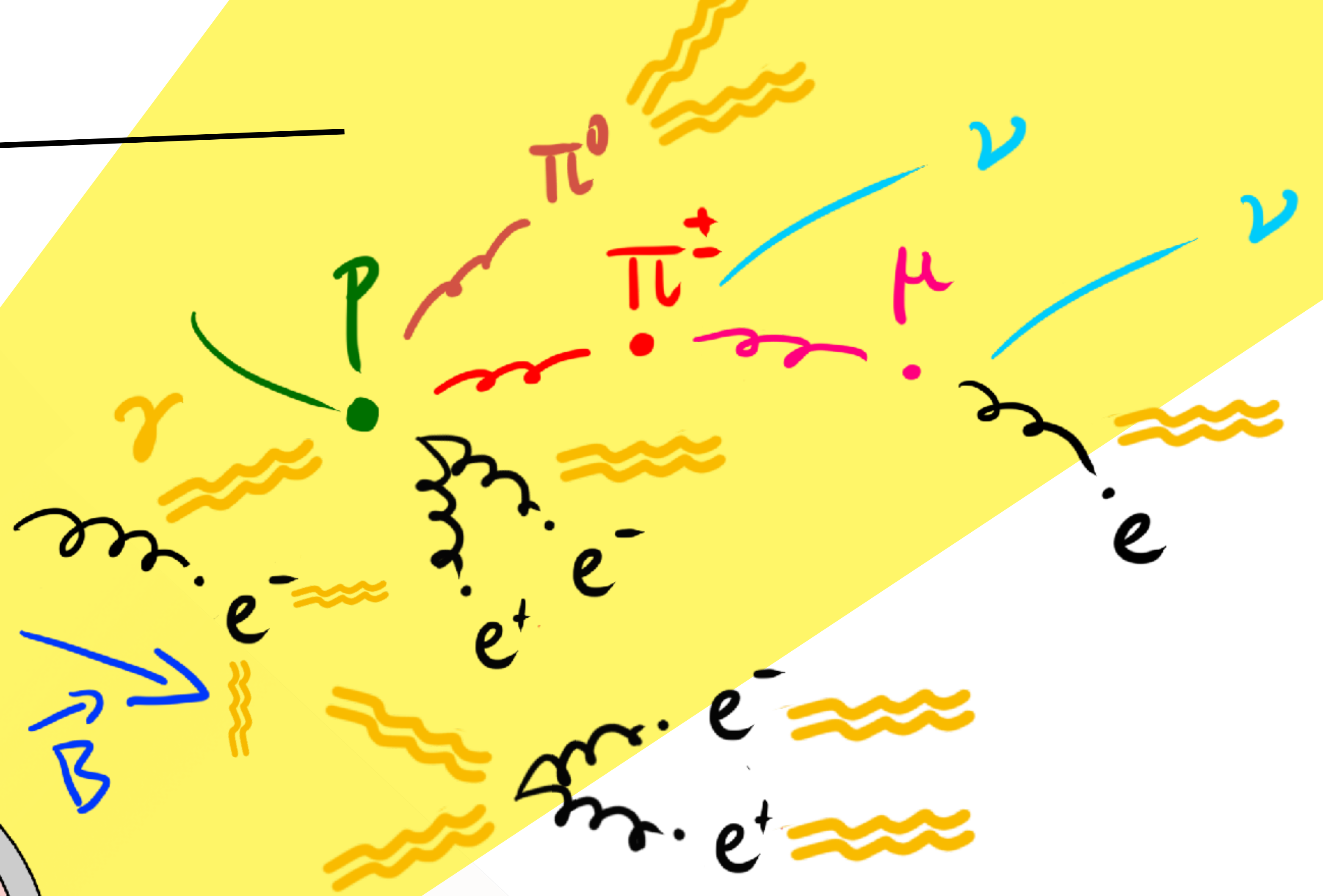
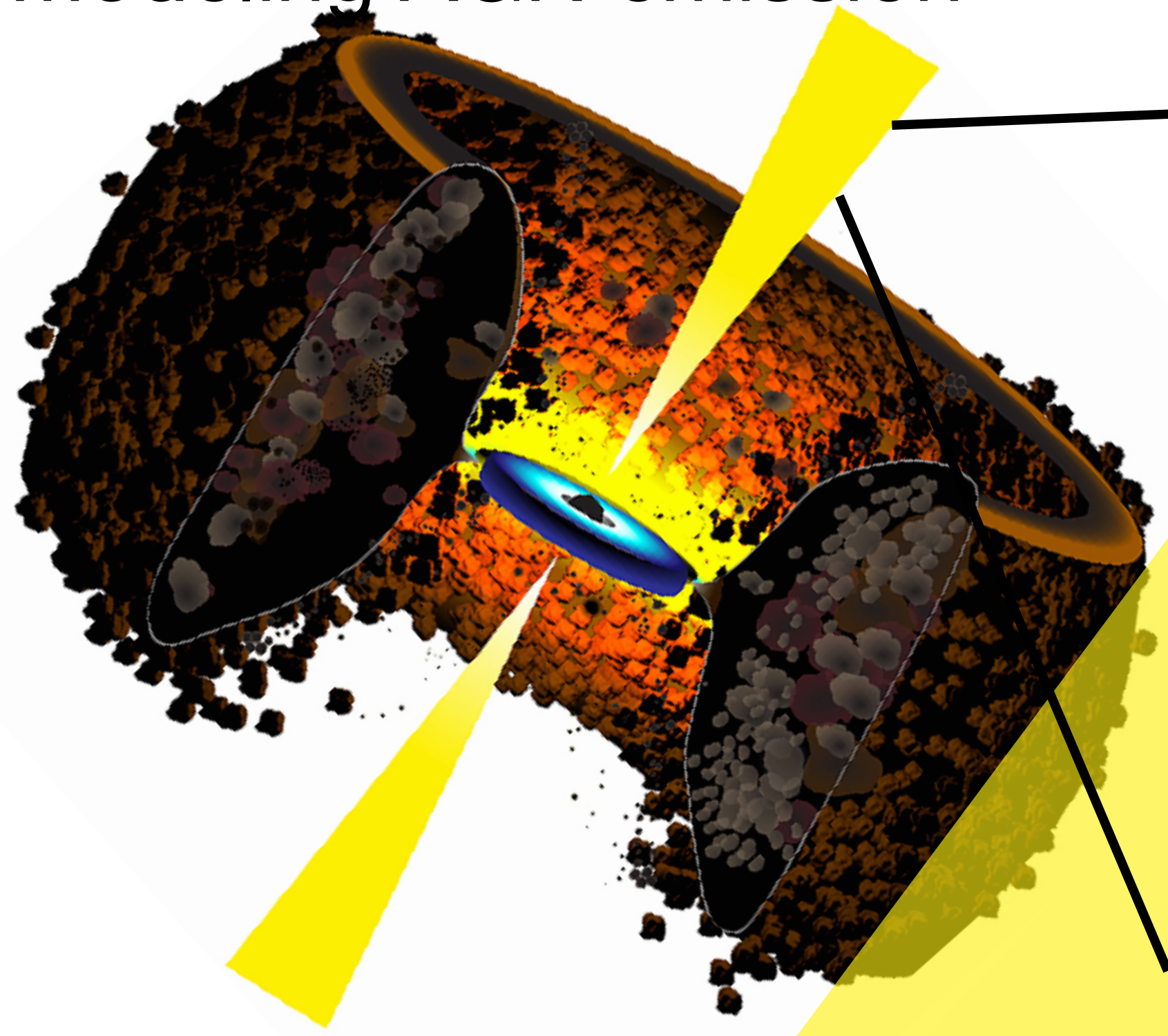
Multimessenger observations of a flaring blazar coincident with high-energy neutrino IceCube-170922A



Modeling AGN emission



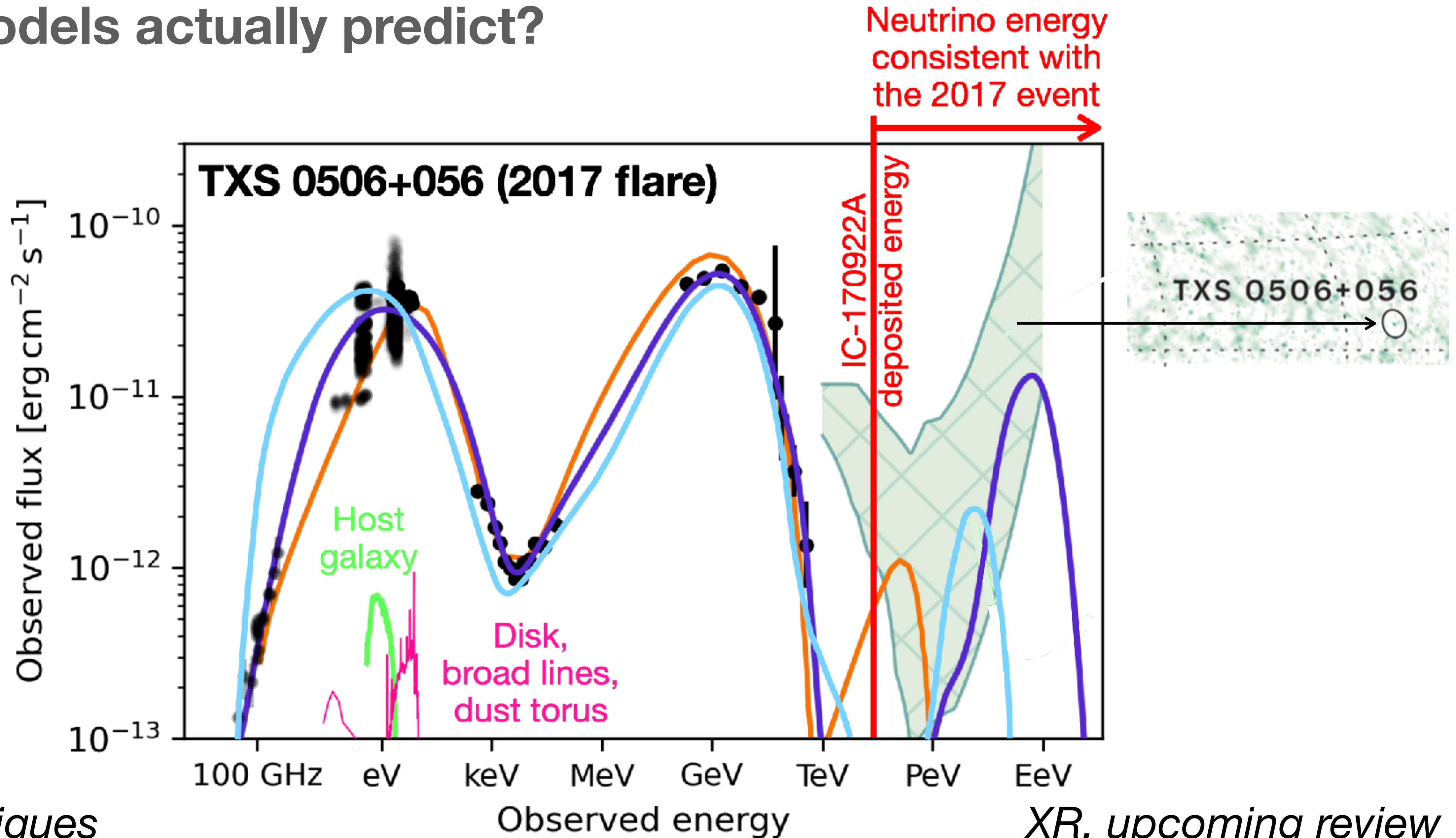
Modeling AGN emission



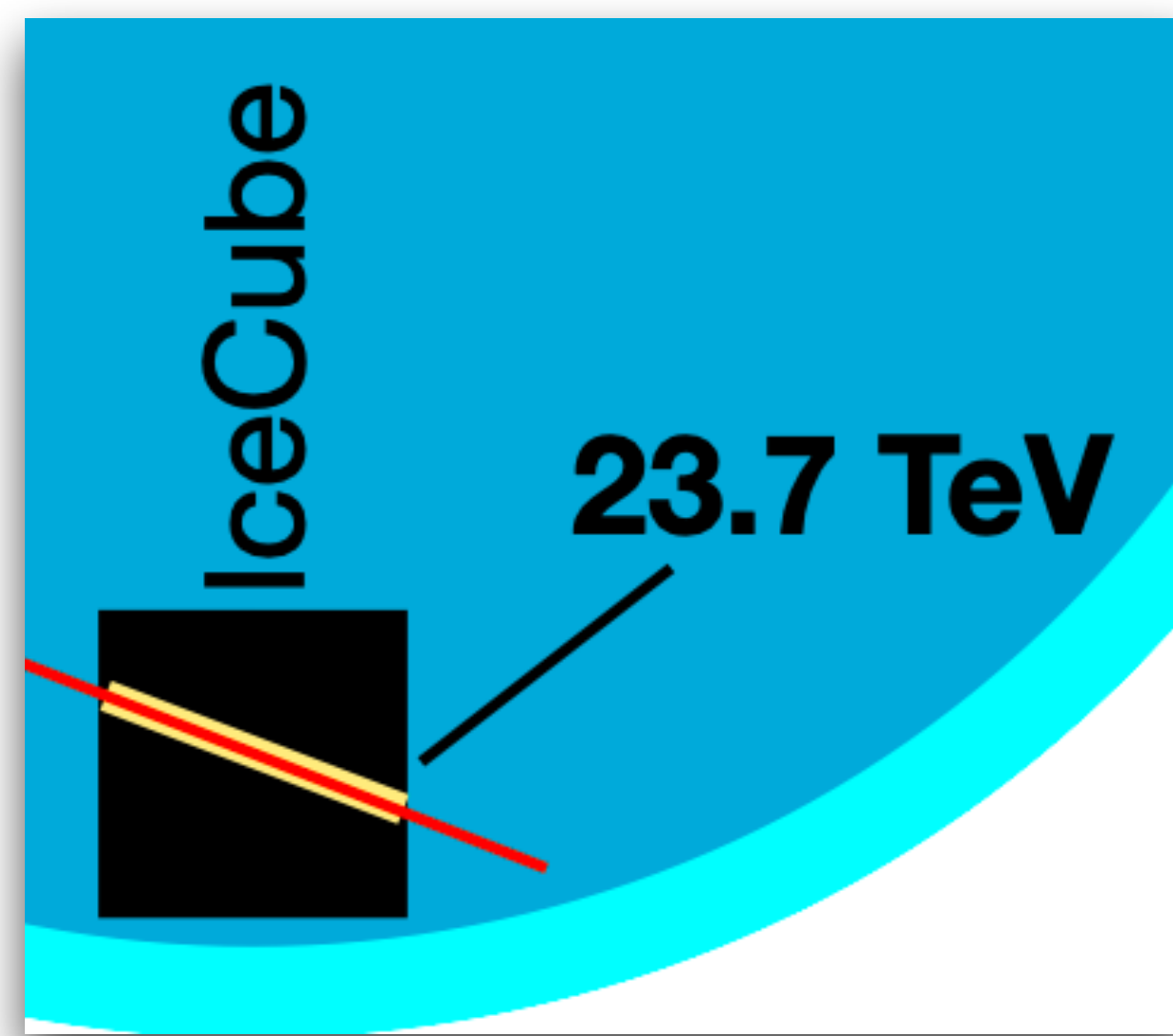
am3.readthedocs.io

Klinger, Rudolph, XR + 2024, ApJS 275

What neutrino emission from blazar TXS 0506+056 do models actually predict?

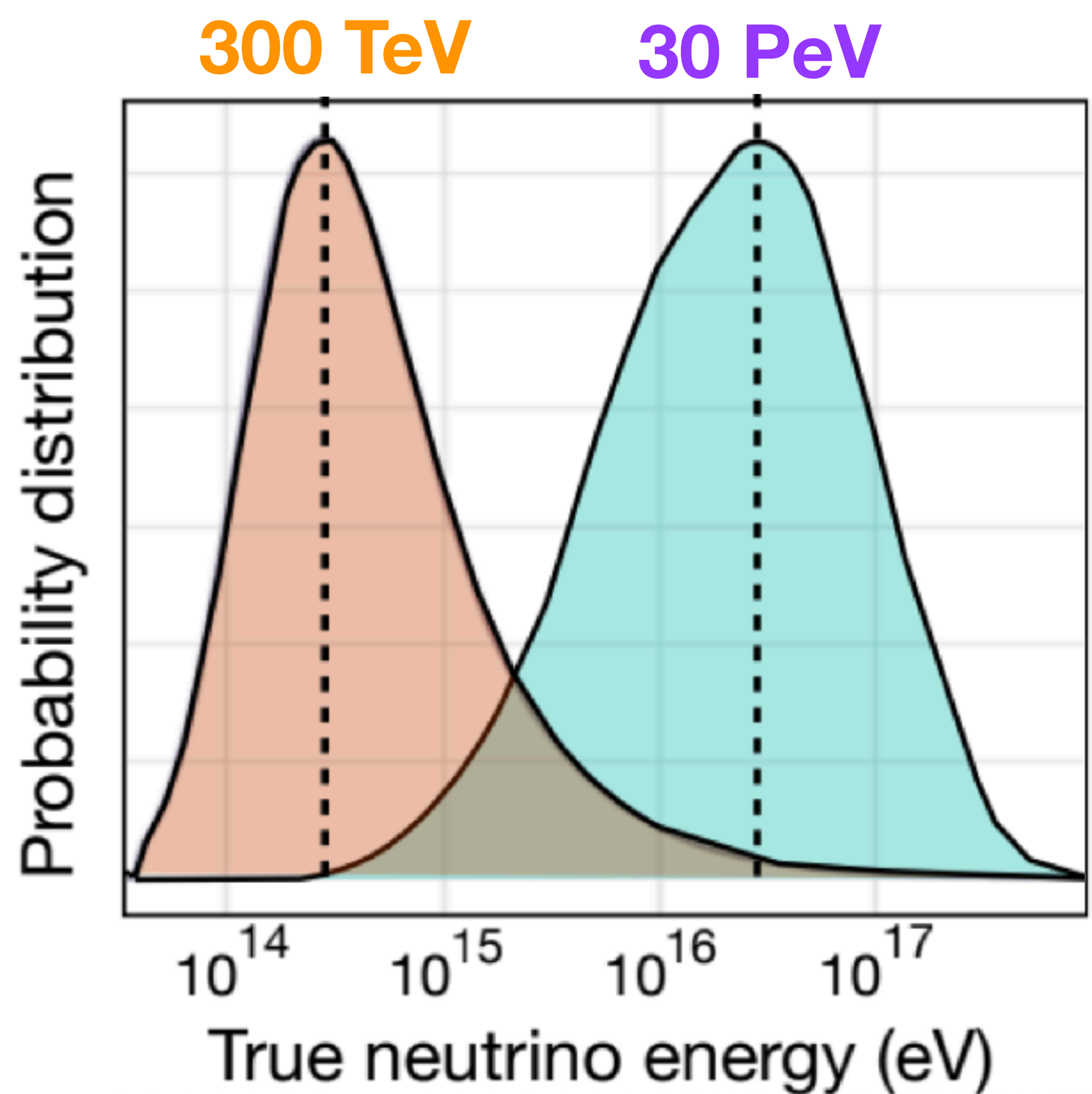
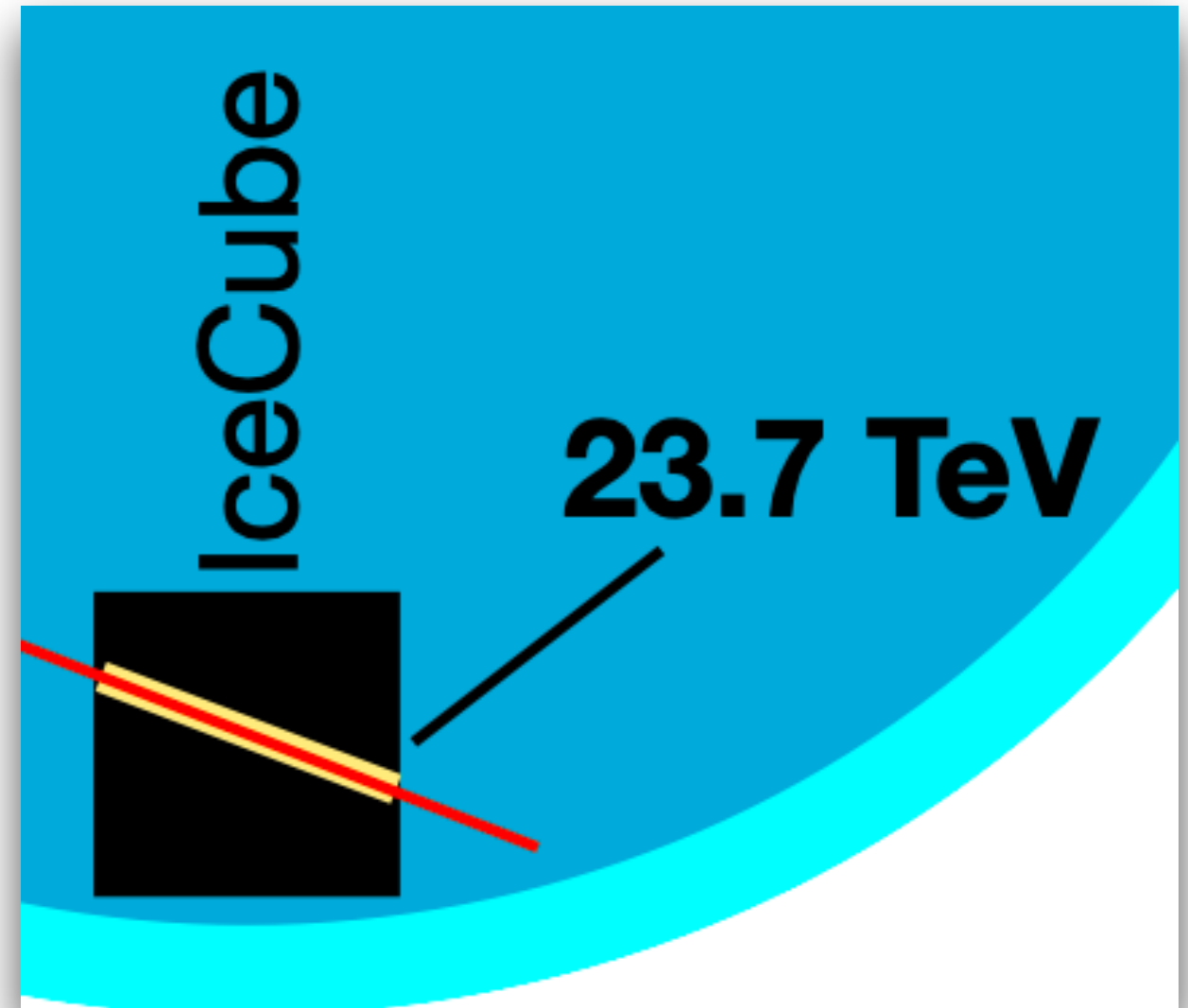
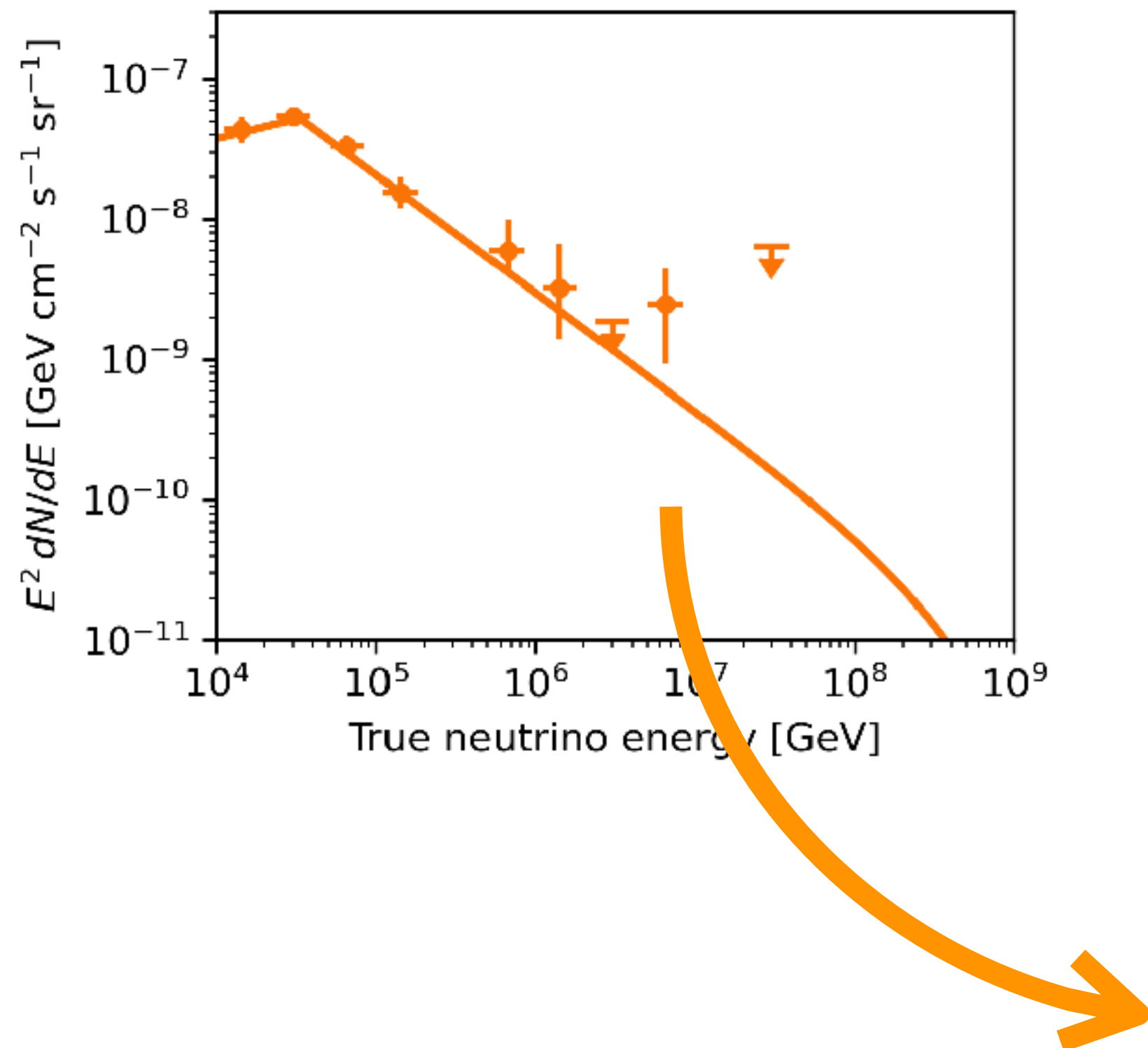


What is the energy
of the IceCube alert
events?

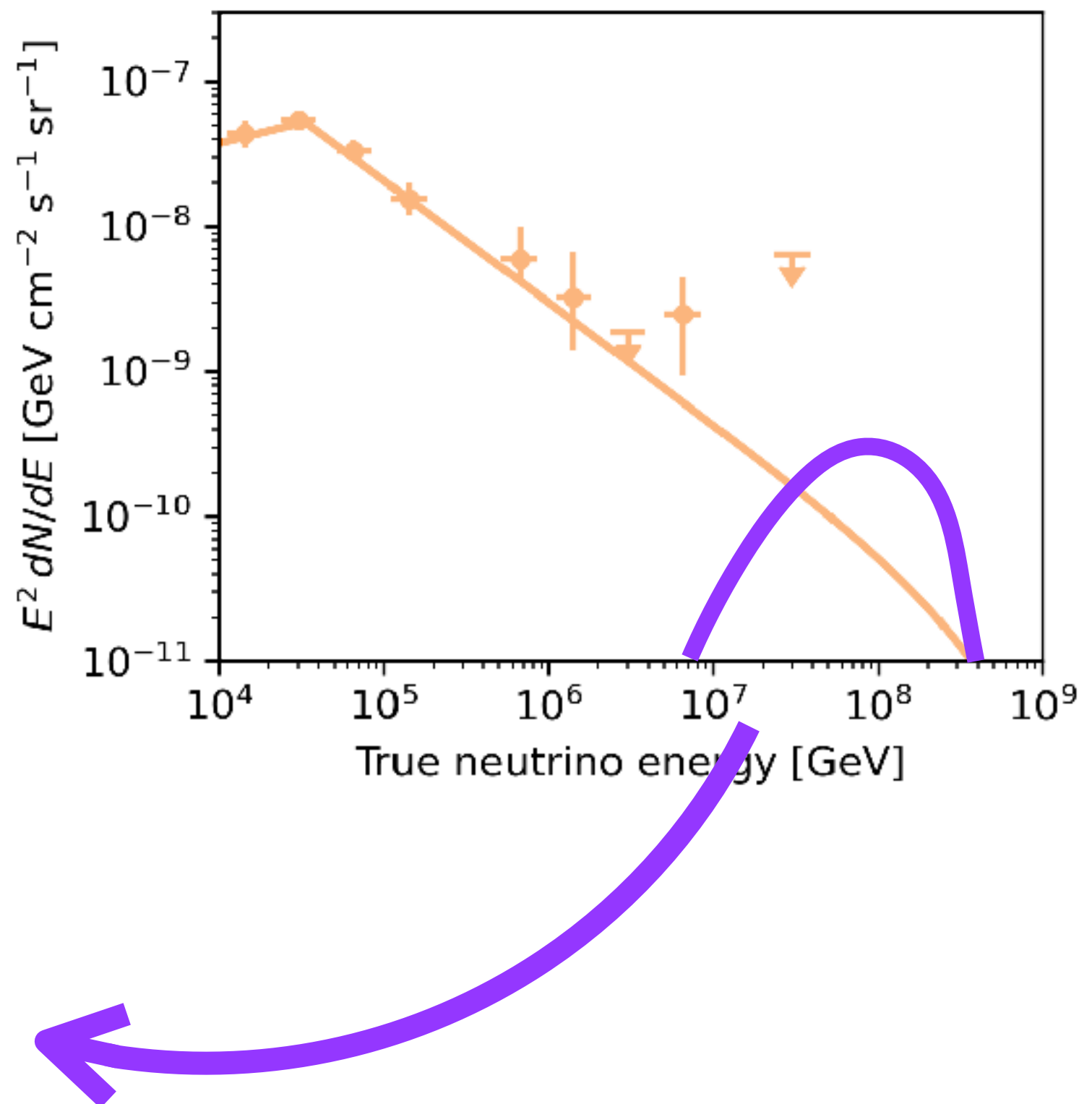


What is the energy of the IceCube alert events?

Sub-TeV assumption

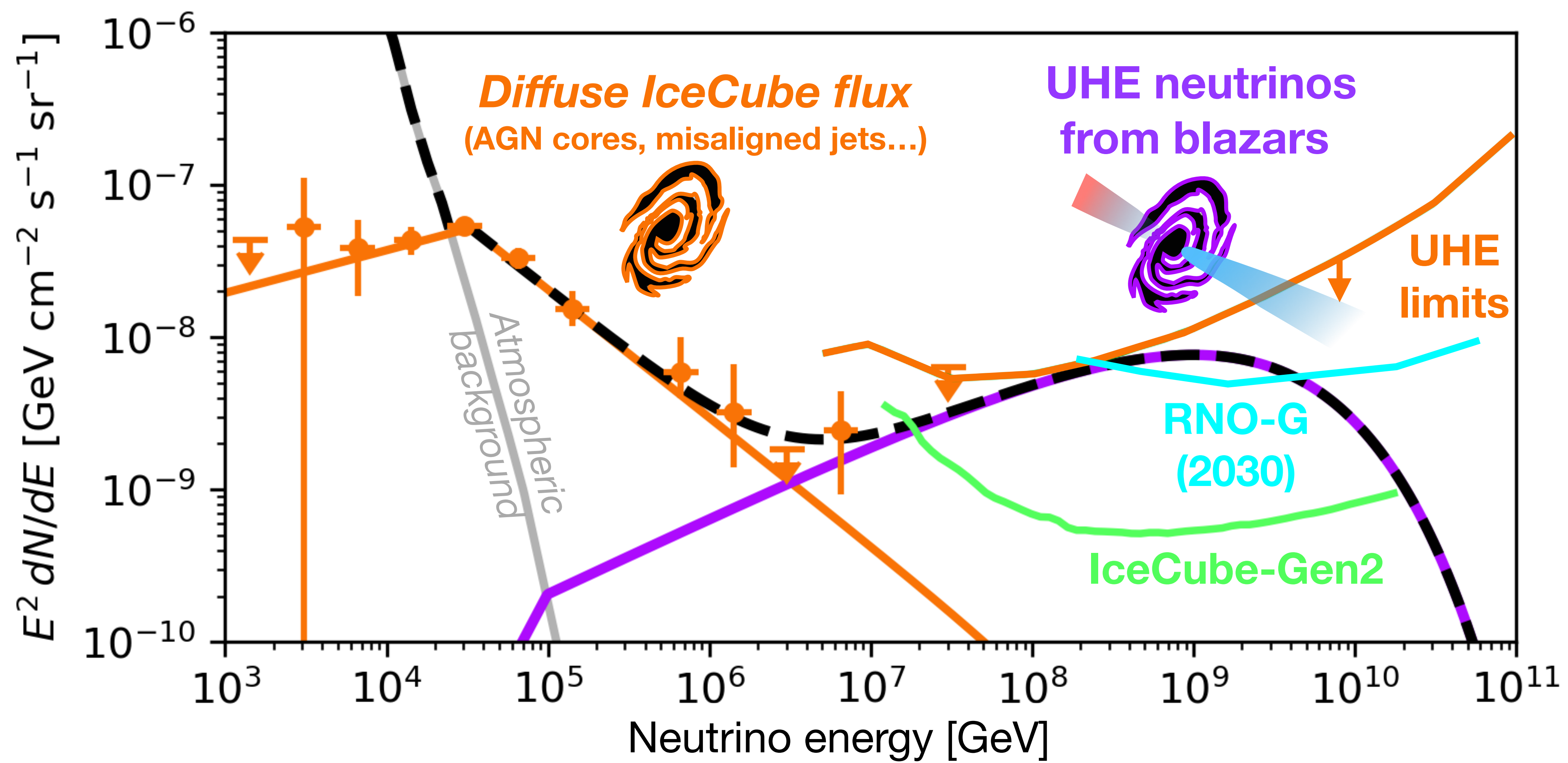


UHE assumption



cf. Kuhlmann & Capel
2025, ApJ 994

UHE neutrinos may be closer than we think



Consistent with Fermi + Auger
(XR+2021 PRL 126)

🔒 | RESEARCH ARTICLE



Multimessenger observations of a flaring blazar coincident with high-energy neutrino IceCube-170922A

THE ICECUBE COLLABORATION, *FERMI*-LAT, *MAGIC*, *AGILE*, *ASAS-SN*, *HAWC*, *H.E.S.S.*, *INTEGRAL*, *KANATA*, [...], AND GREGORY SIVAKOFF

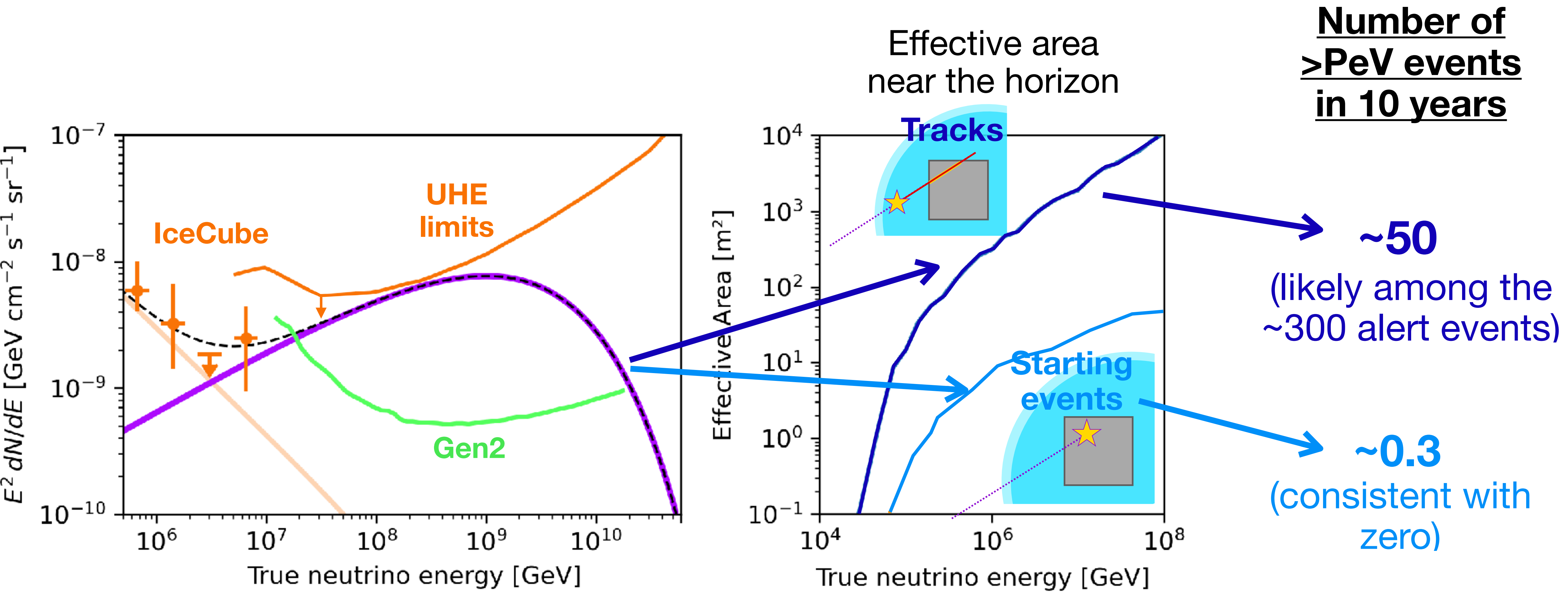
+991 authors

[Authors Info &](#)[Affiliations](#)

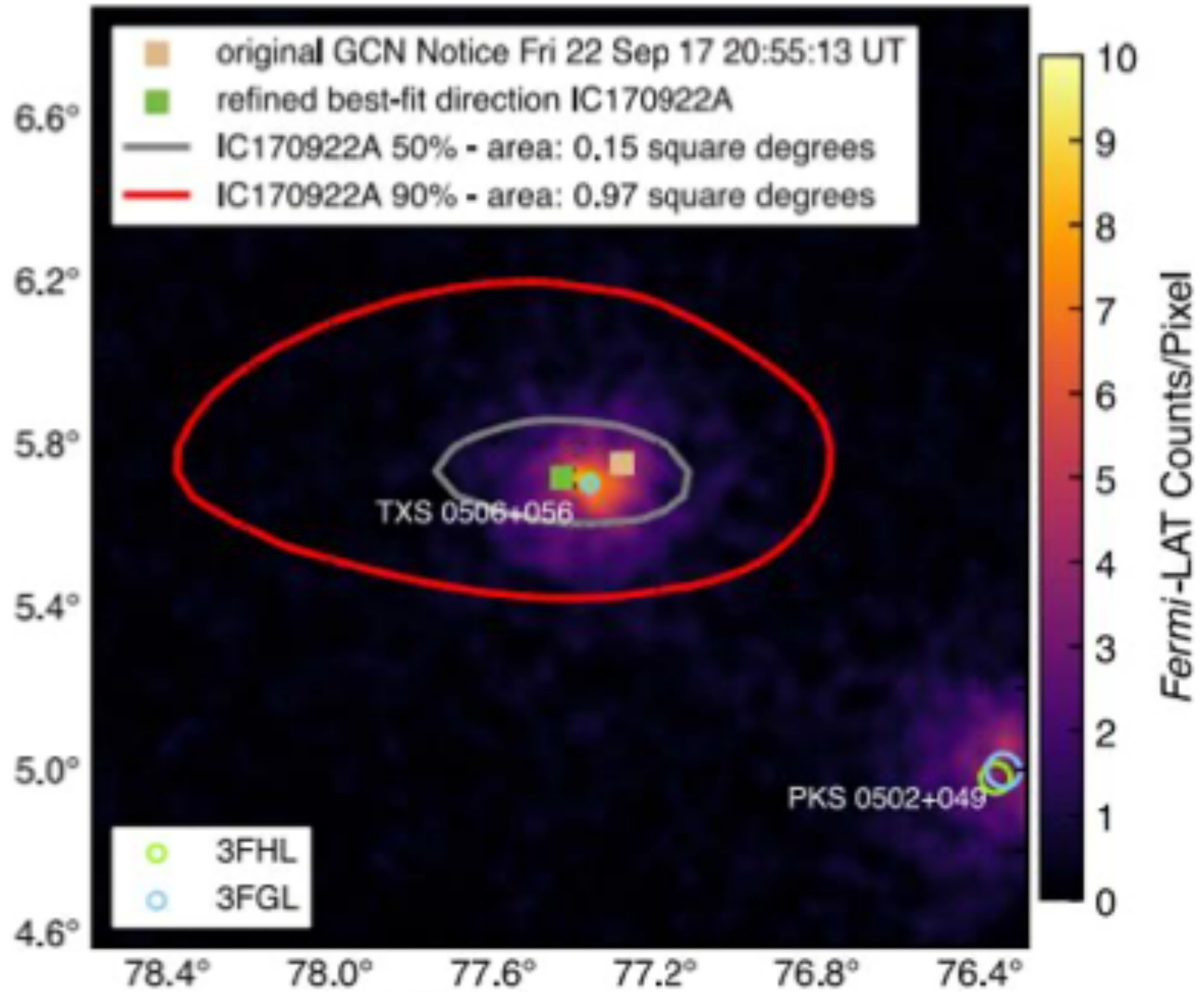
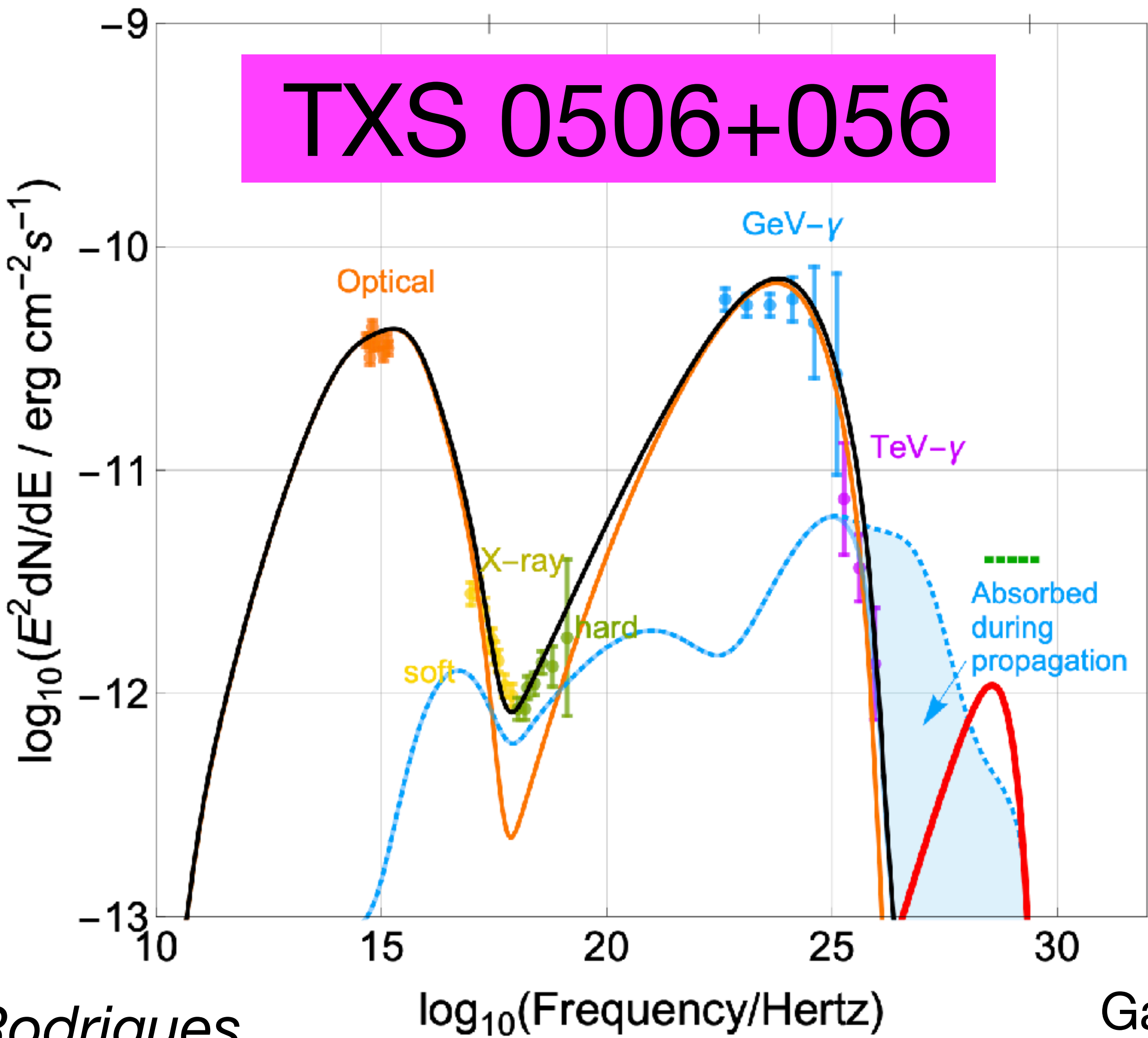
rays accelerated in the jet interact with nearby gas or photons. On 22 September 2017, the cubic-kilometer IceCube Neutrino Observatory detected a ~290-TeV neutrino from a direction consistent with the flaring γ -ray blazar TXS 0506+056. We

 ν [Hz]

How many events have blazars produced in IceCube?

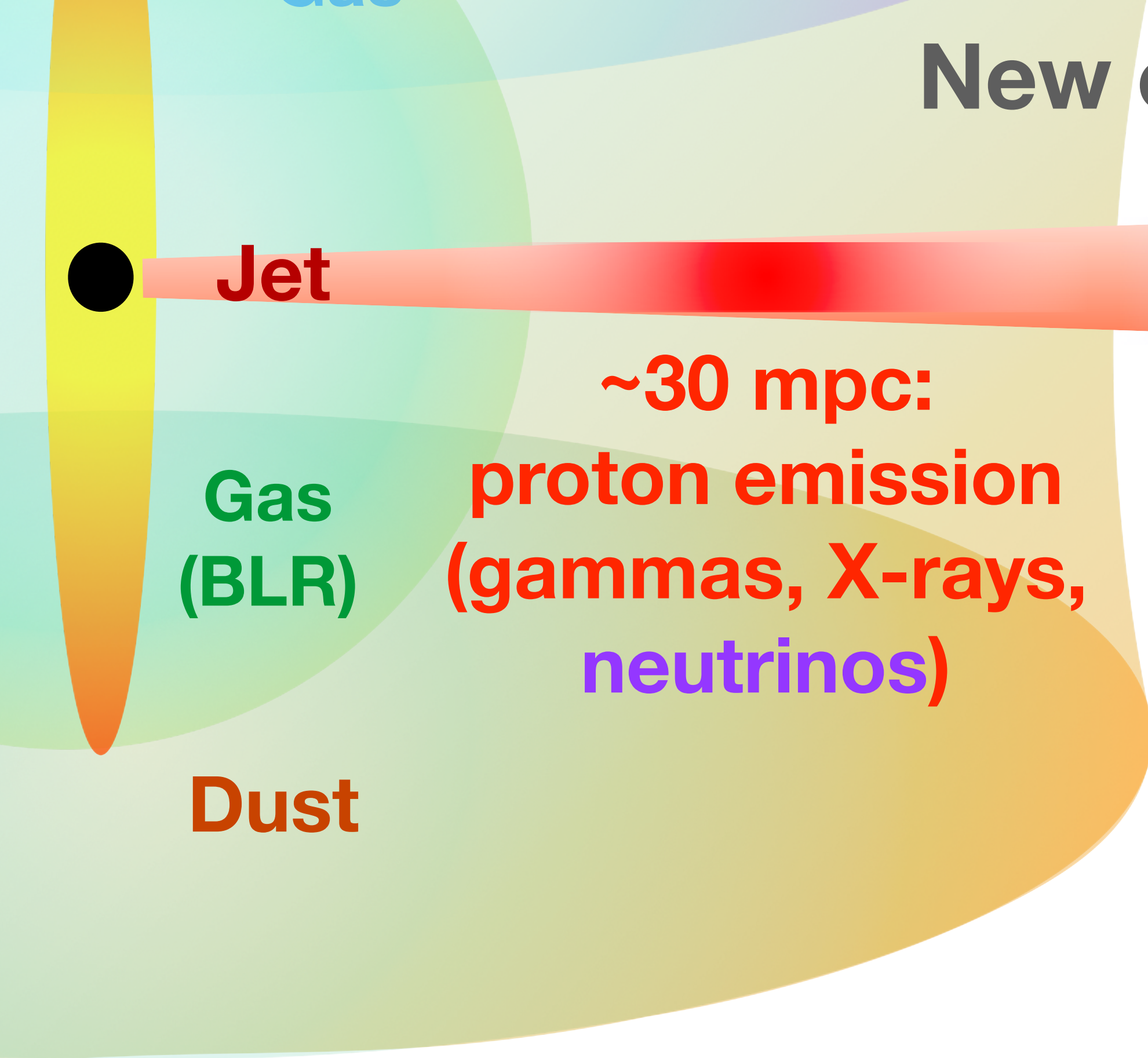


Modeling AGN emission



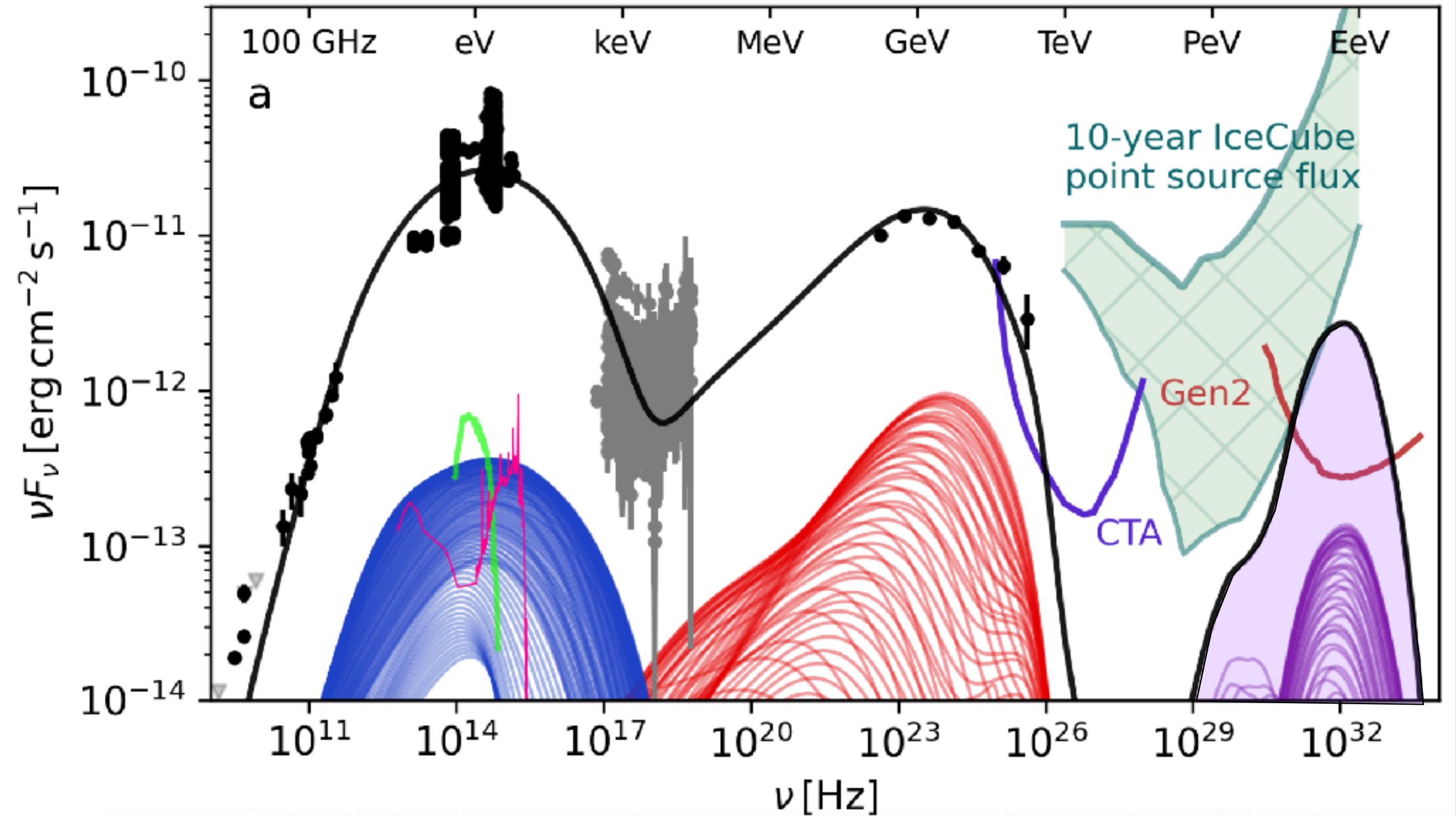
IceCube, Fermi-LAT, et al (2018) Science 361

New extended jet model

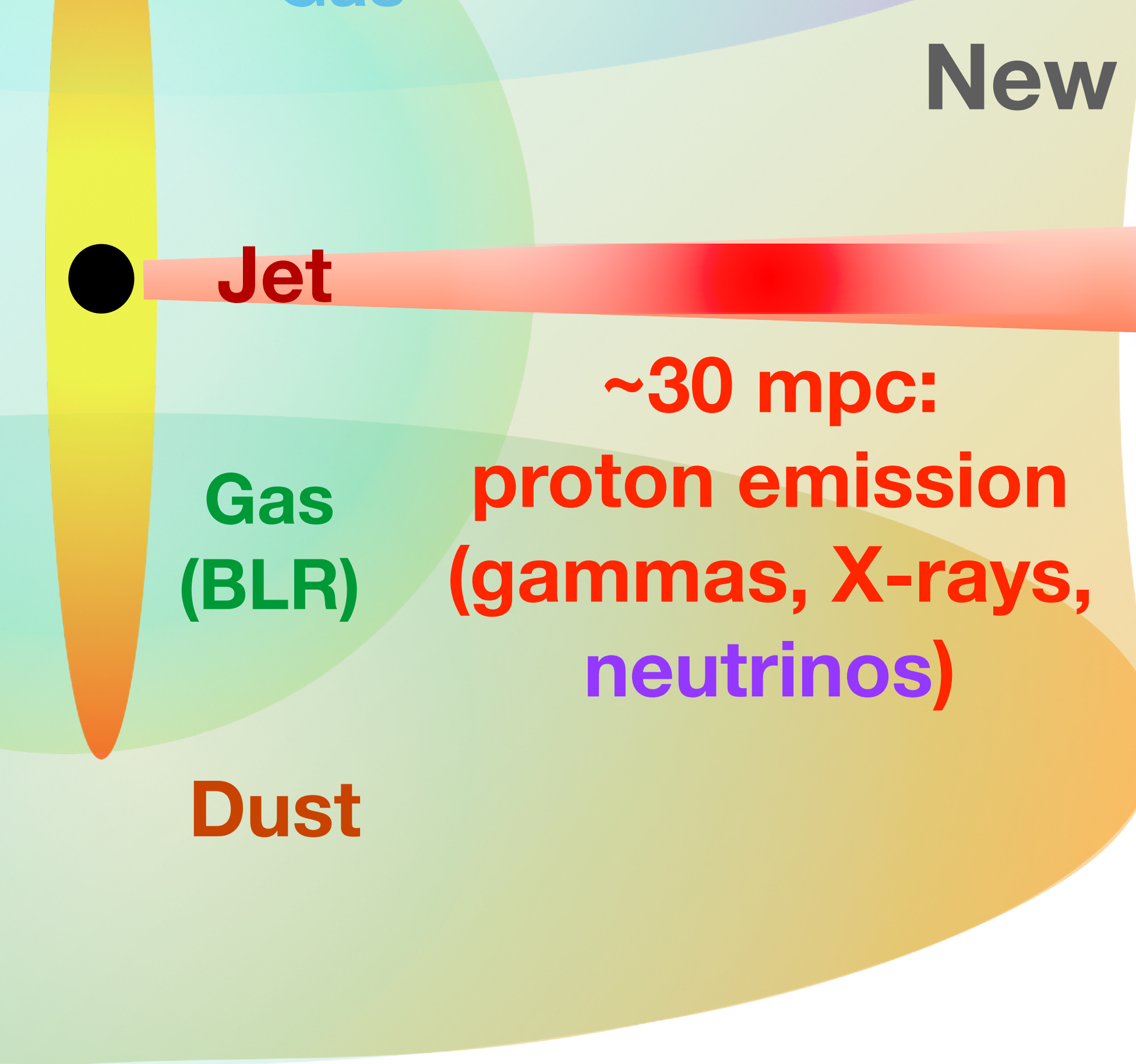


~ pc:
optical

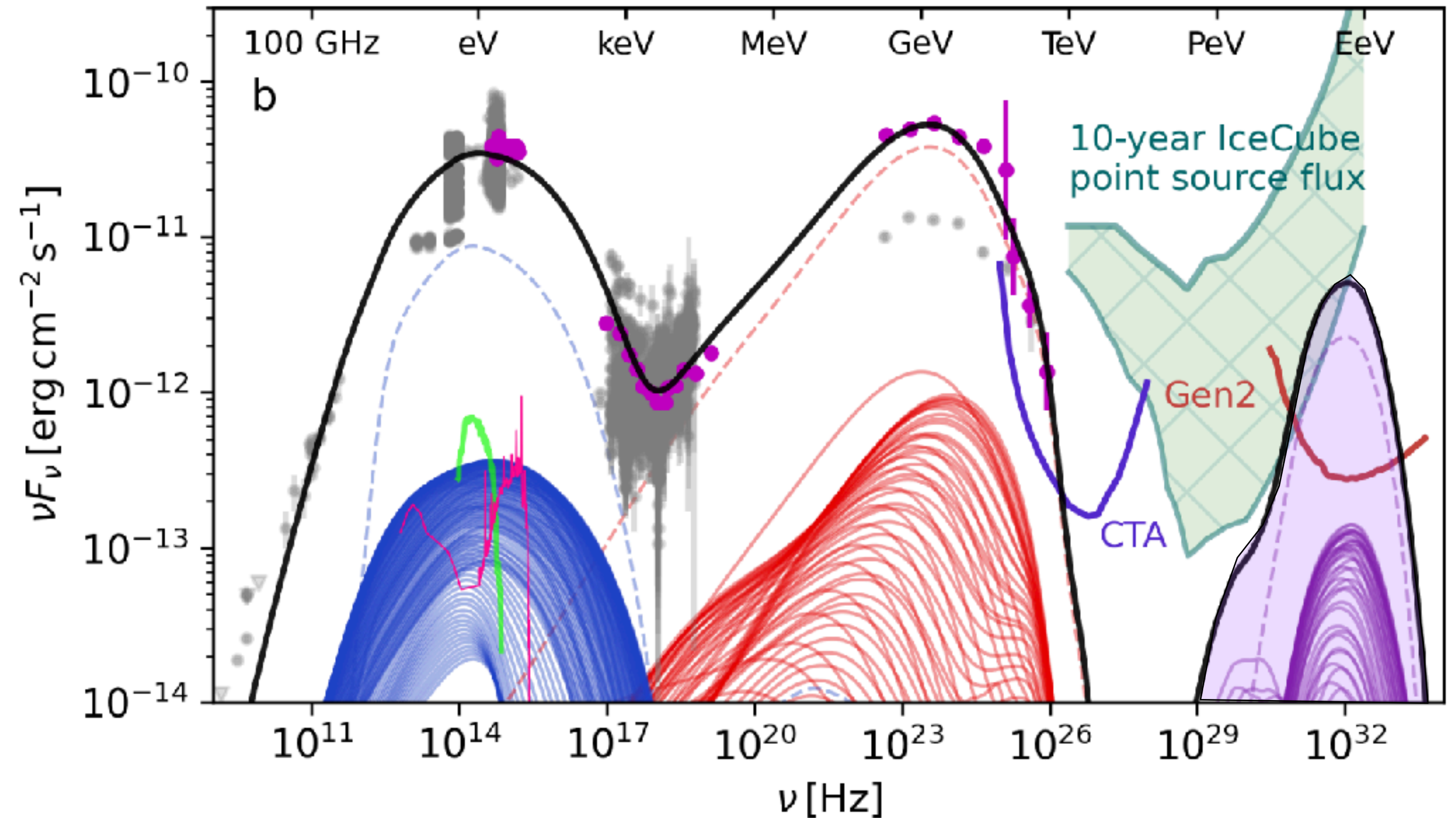
TXS 0506+056



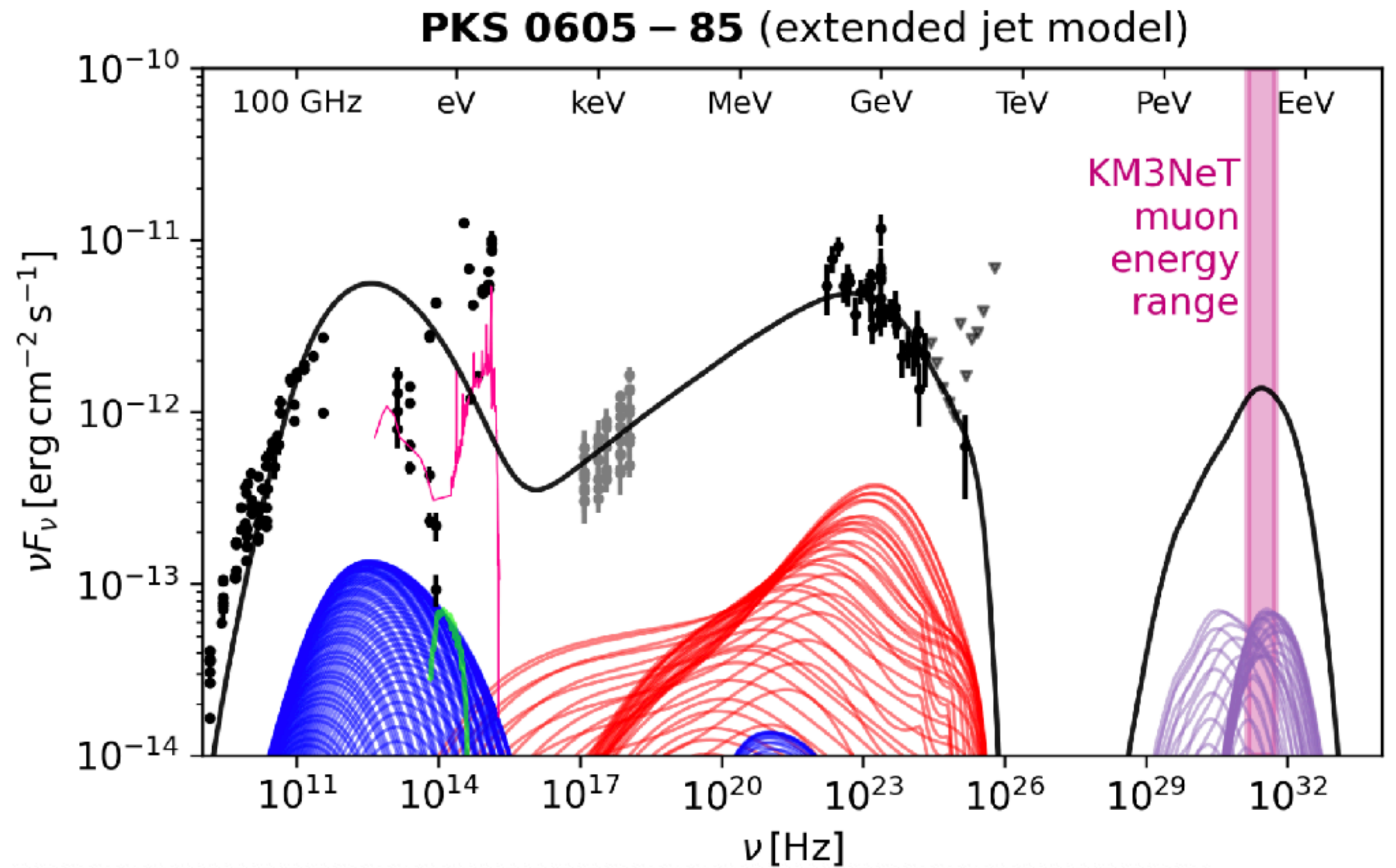
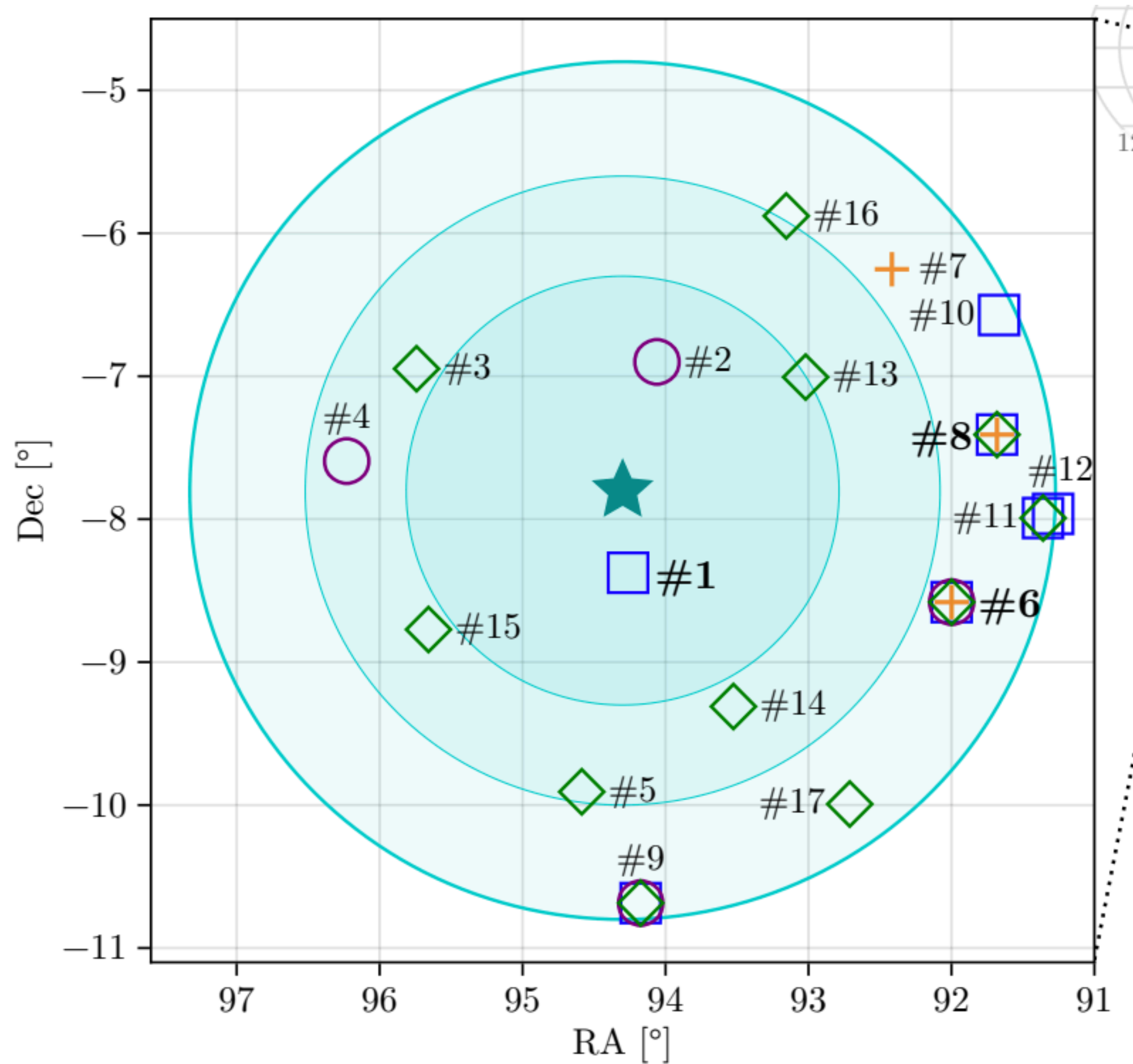
New extended jet model



TXS 0506+056 (2017 flare)



KM3-230213A candidates (KM3NeT collaboration, 2025)



XR, Rieger, Bohdan & Padovani 2025 (A&A, upcoming)

