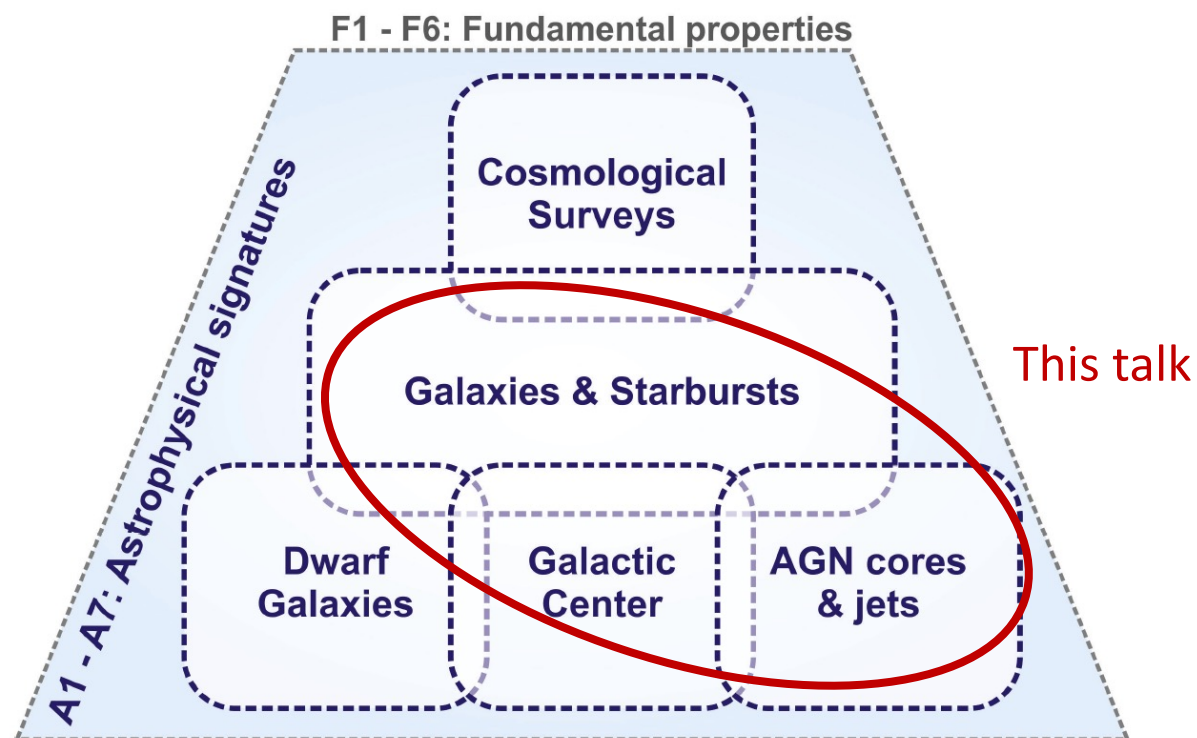


A biased view on SFB1491 from an observer's perspective

Anna Franckowiak

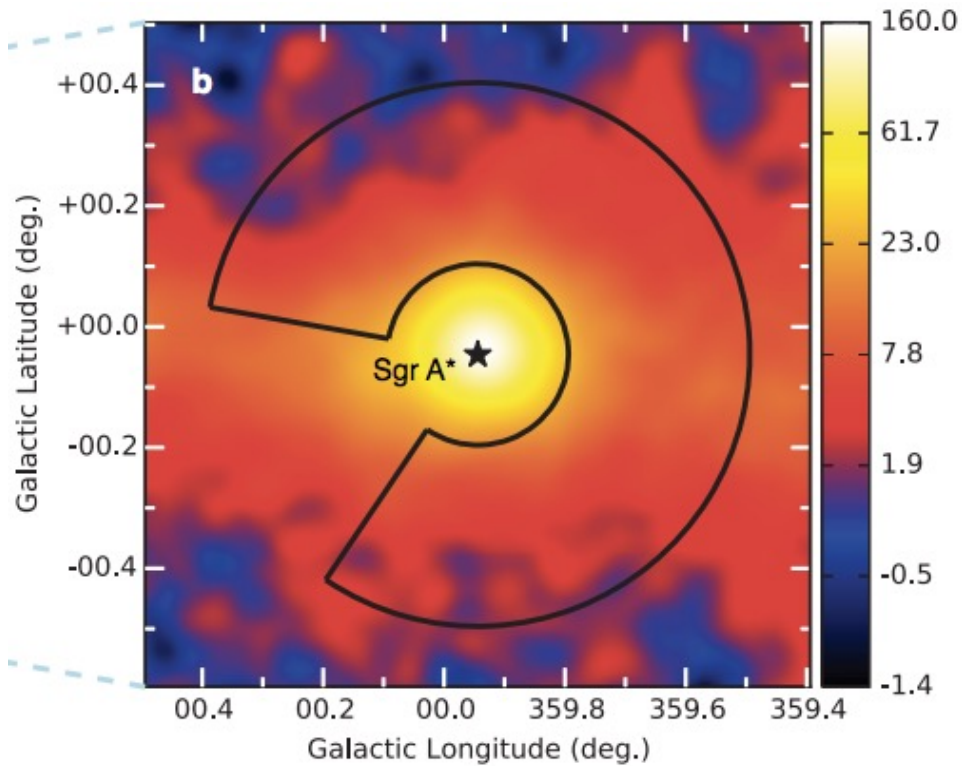
Research question (1): What are the signatures of the interplay between magnetized, turbulent astrophysical plasmas and cosmic rays, and what can they tell us about the origin of cosmic rays?

- Milky Way
- Seyfert Galaxies
- TDEs

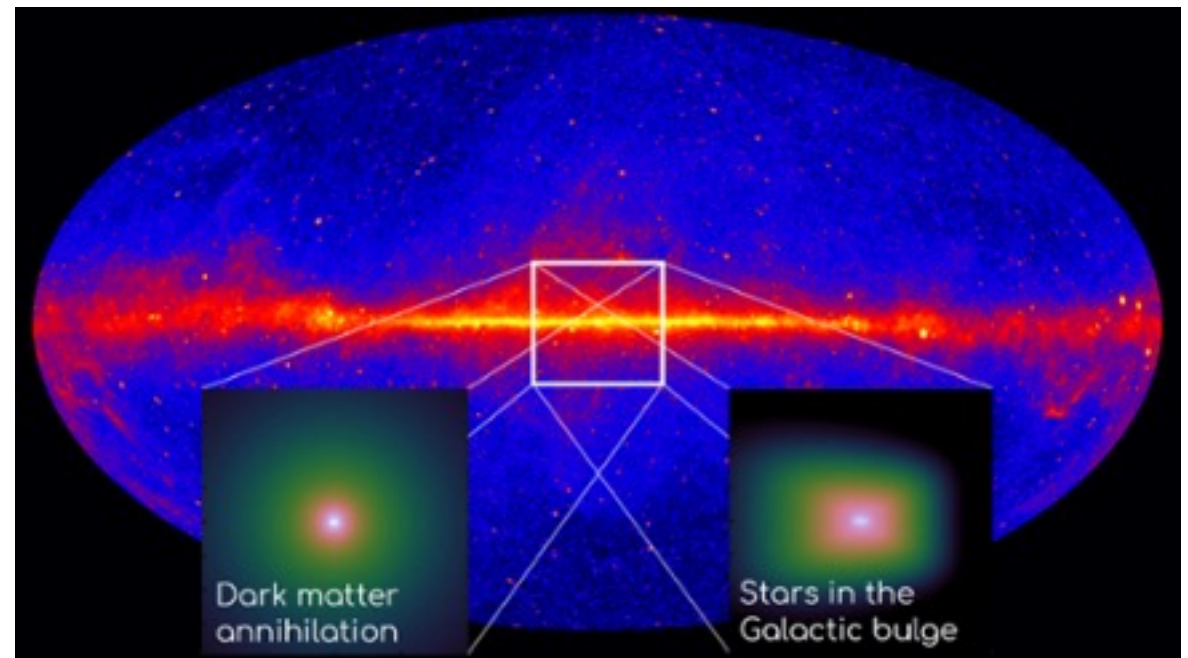


Interesting and complicated region

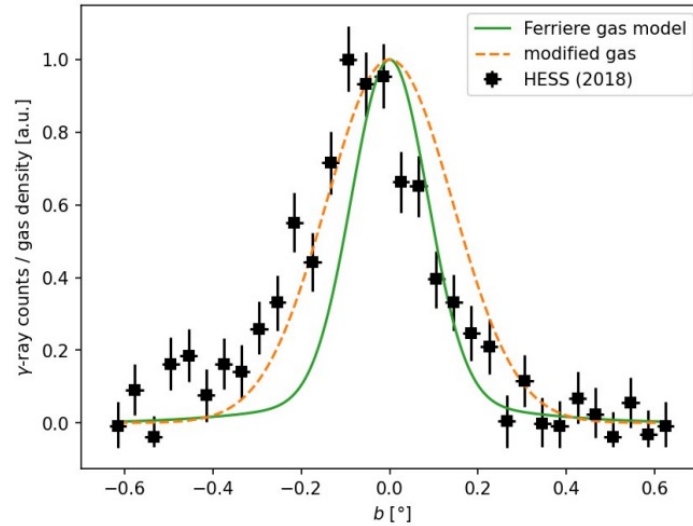
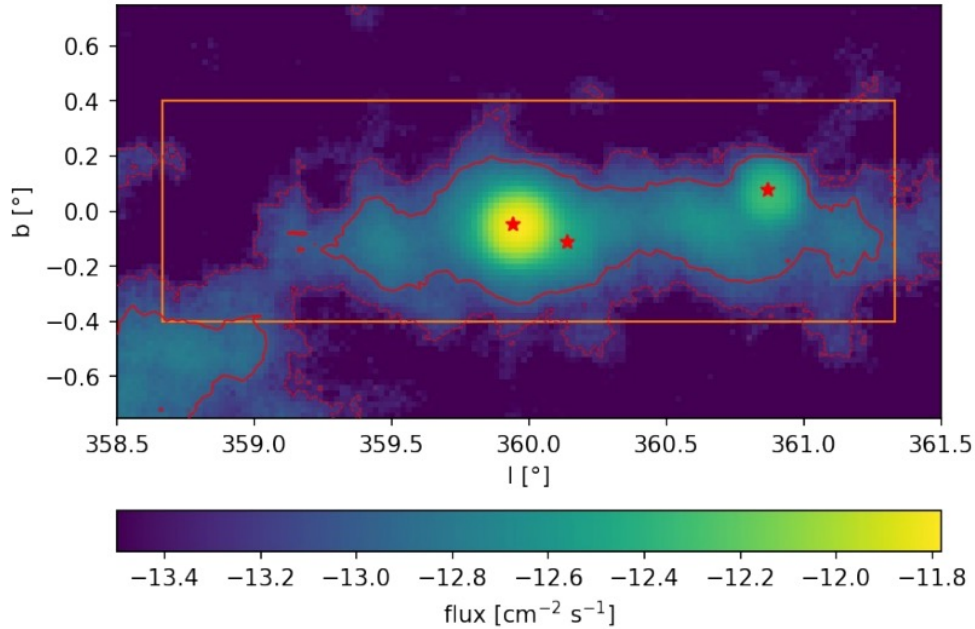
PeVatron found by H.E.S.S.



Galactic Center Excess in Fermi-LAT data



Talk by Dominik
Elsässer



Findings:

- counts and fluxes favour isotropic diffusion
- spectra favour anisotropic diffusion
- E^{-2} source spectra favoured

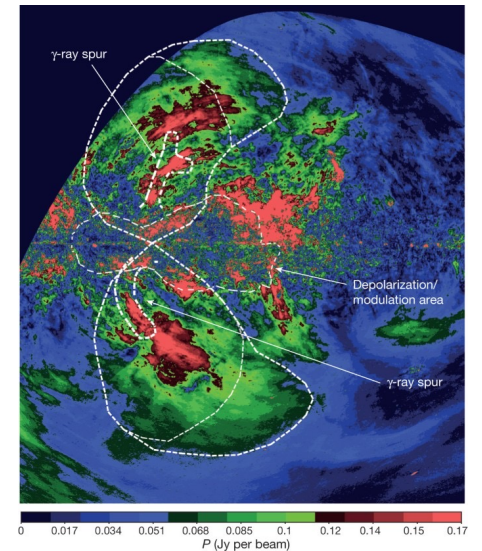
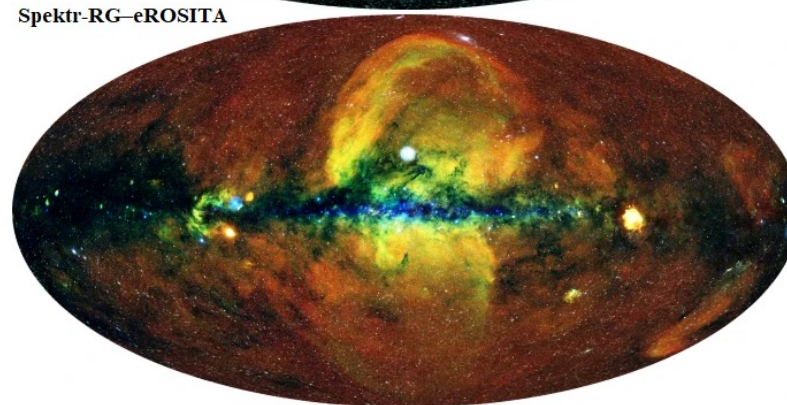
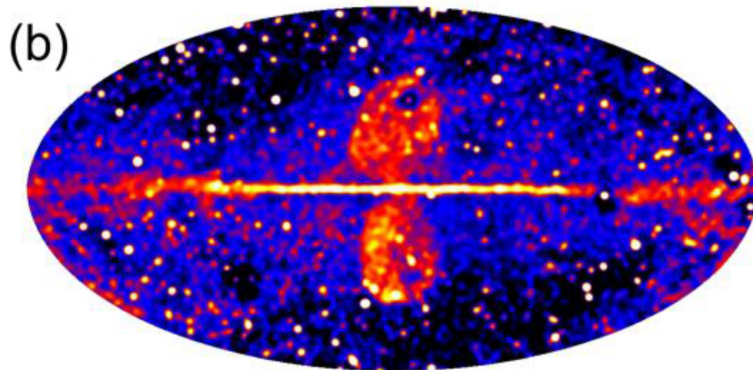
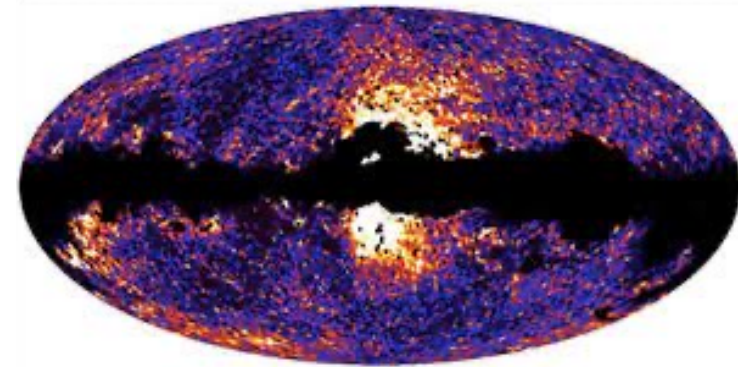
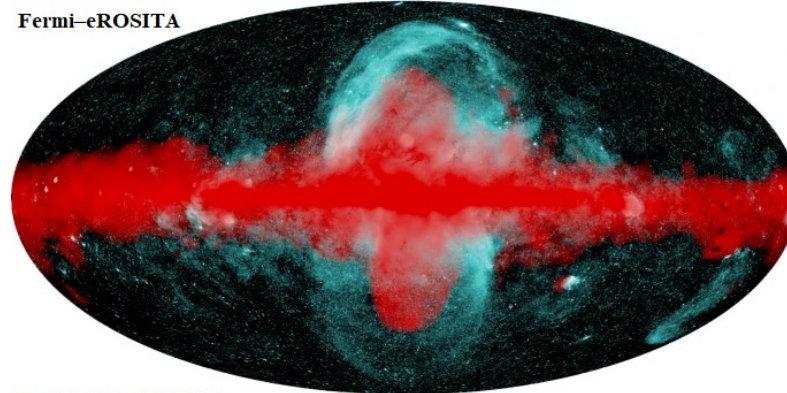
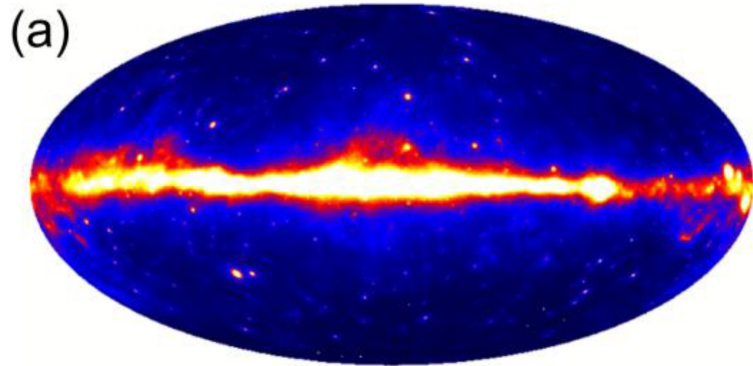
Doerner et al., *PoS ICRC2023* (2023) 584
 Becker Tjus et al., submitted (2022)



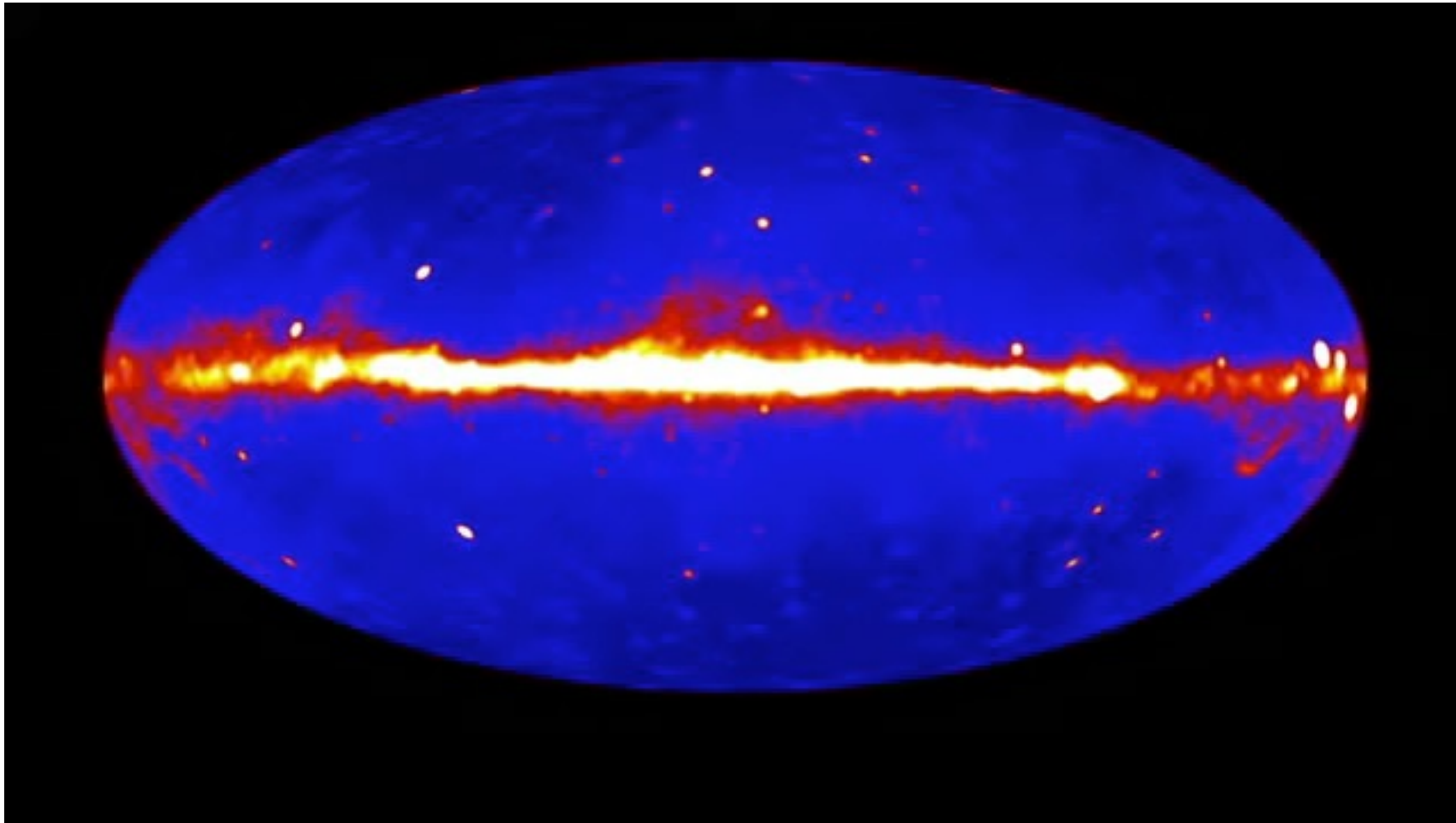
Modeling of TeV emission in 3D:

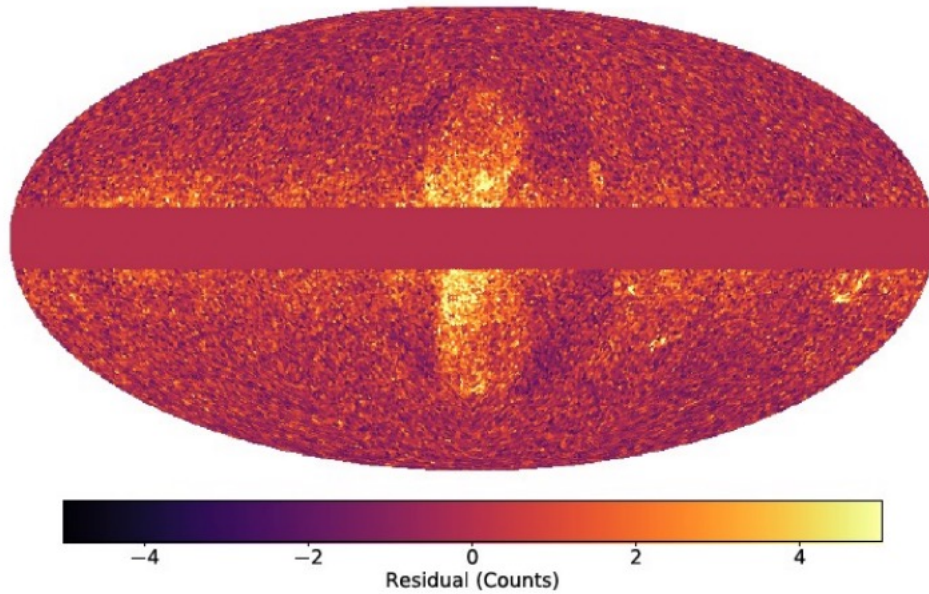
- gas distribution
 - Photon fields
 - Magnetic field (large scale & small-scale imprints of molecular clouds and non-thermal filaments)
 - Test different different anisotropies of diffusion tensor
- compare to H.E.S.S. measurements

Large Scale Excess seen in gamma-ray, microwave and X-ray data



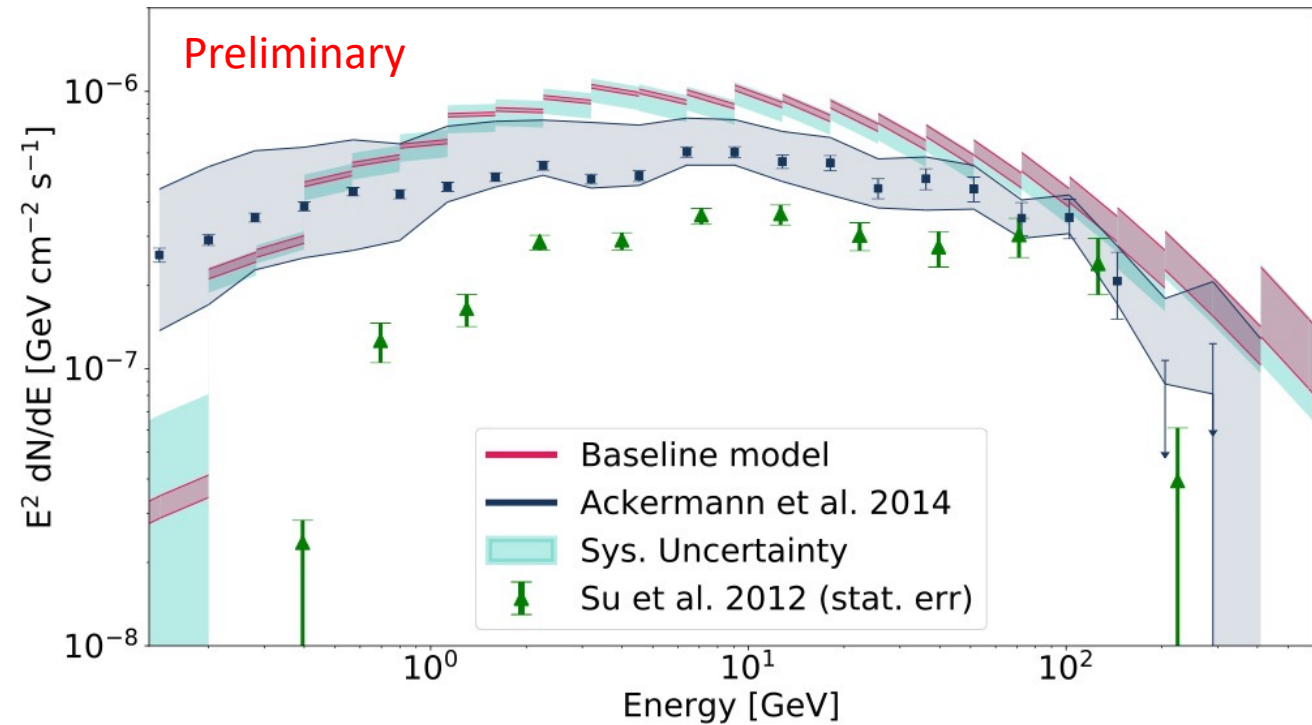
Large Scale Excess seen in gamma-ray, microwave and X-ray data



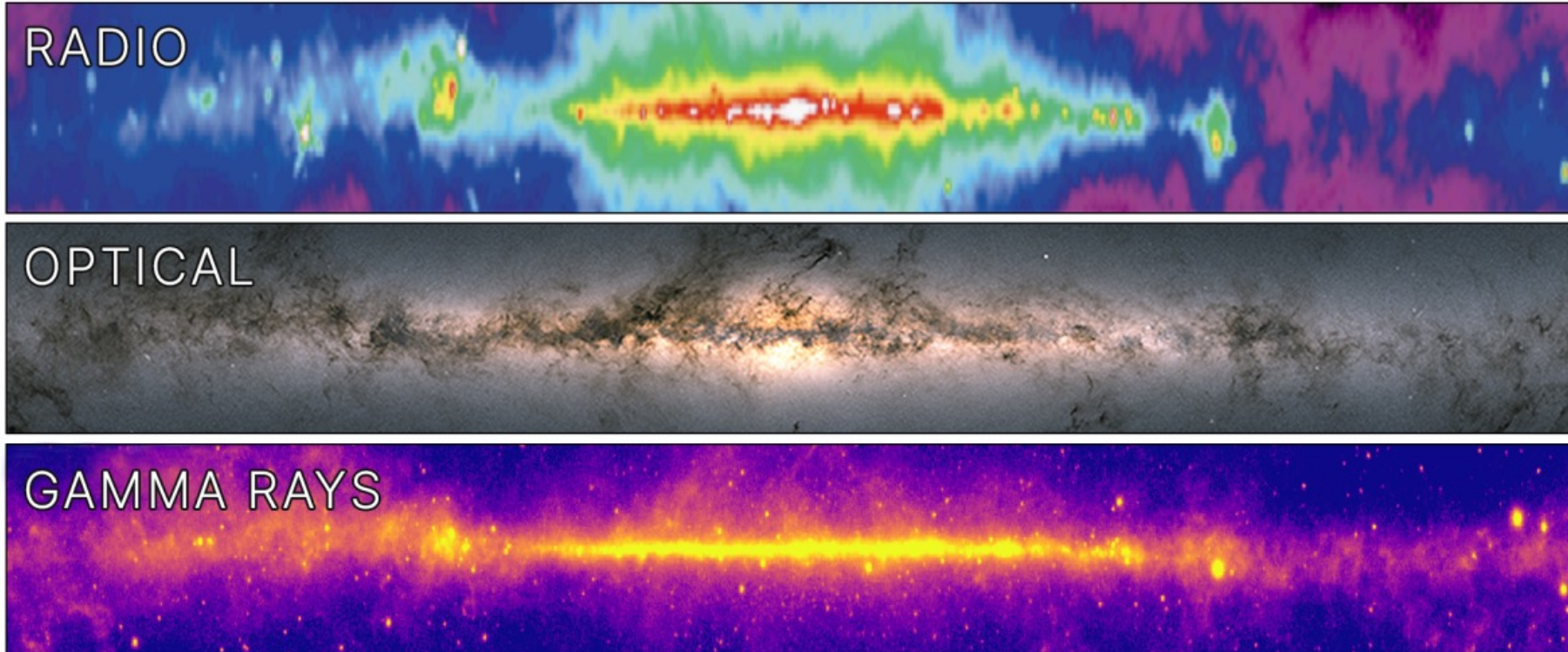


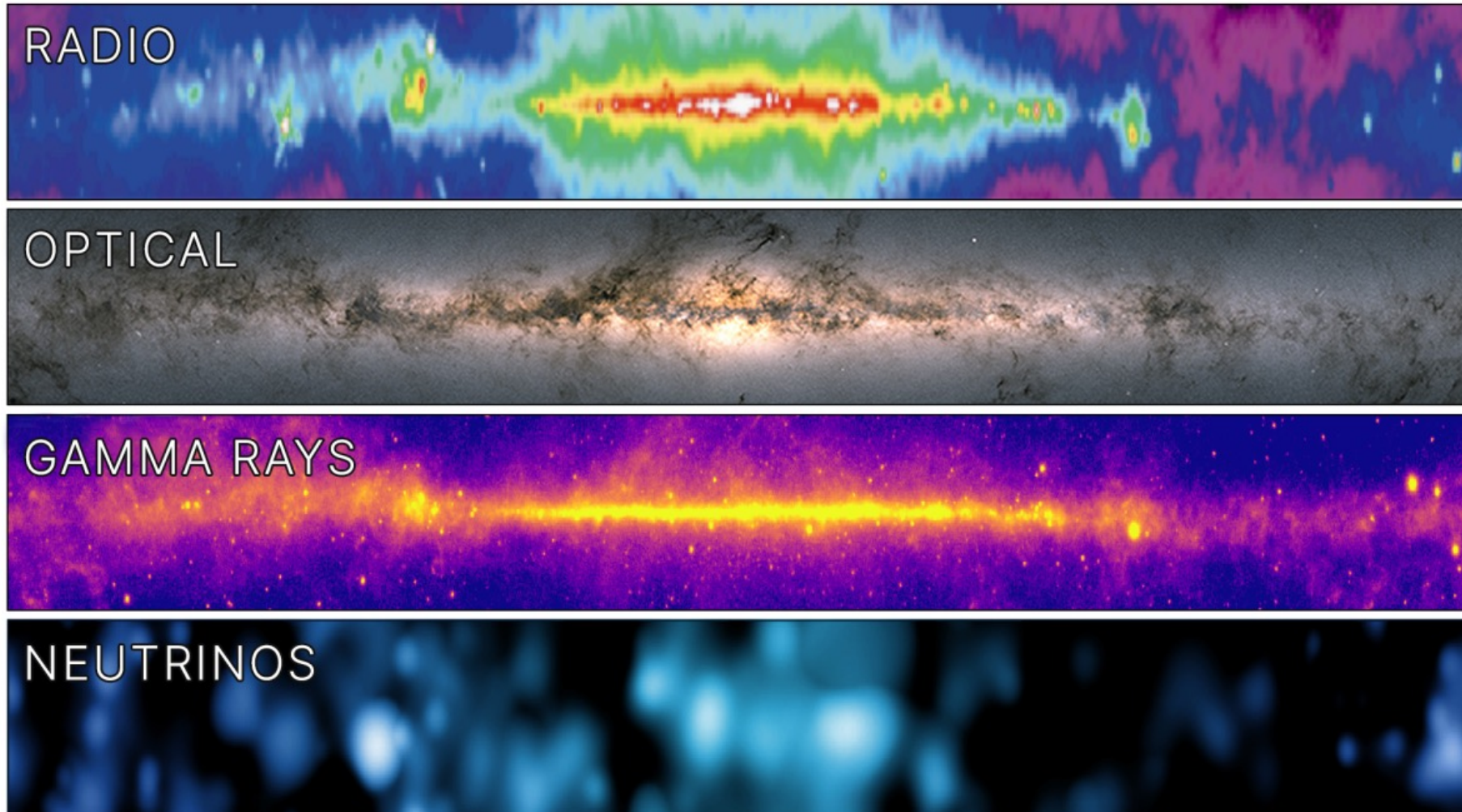
Modeling of GeV emission using GALPROP
→ compare to Fermi-LAT measurements

Status: repeated previous analysis with 12 instead of 4 years of data, new foreground models



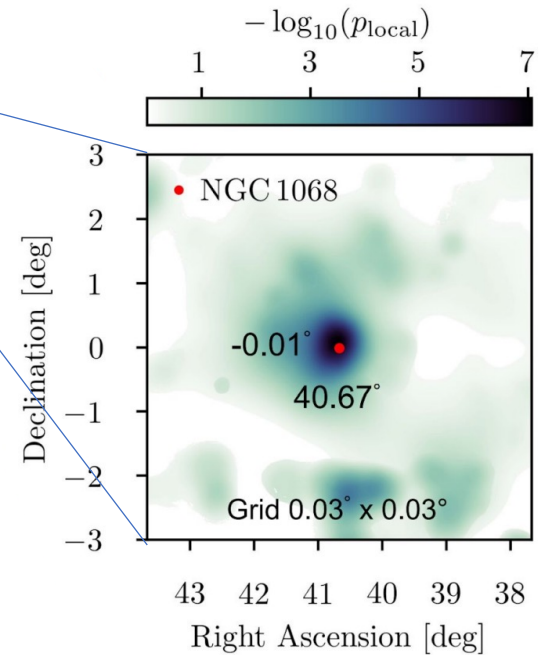
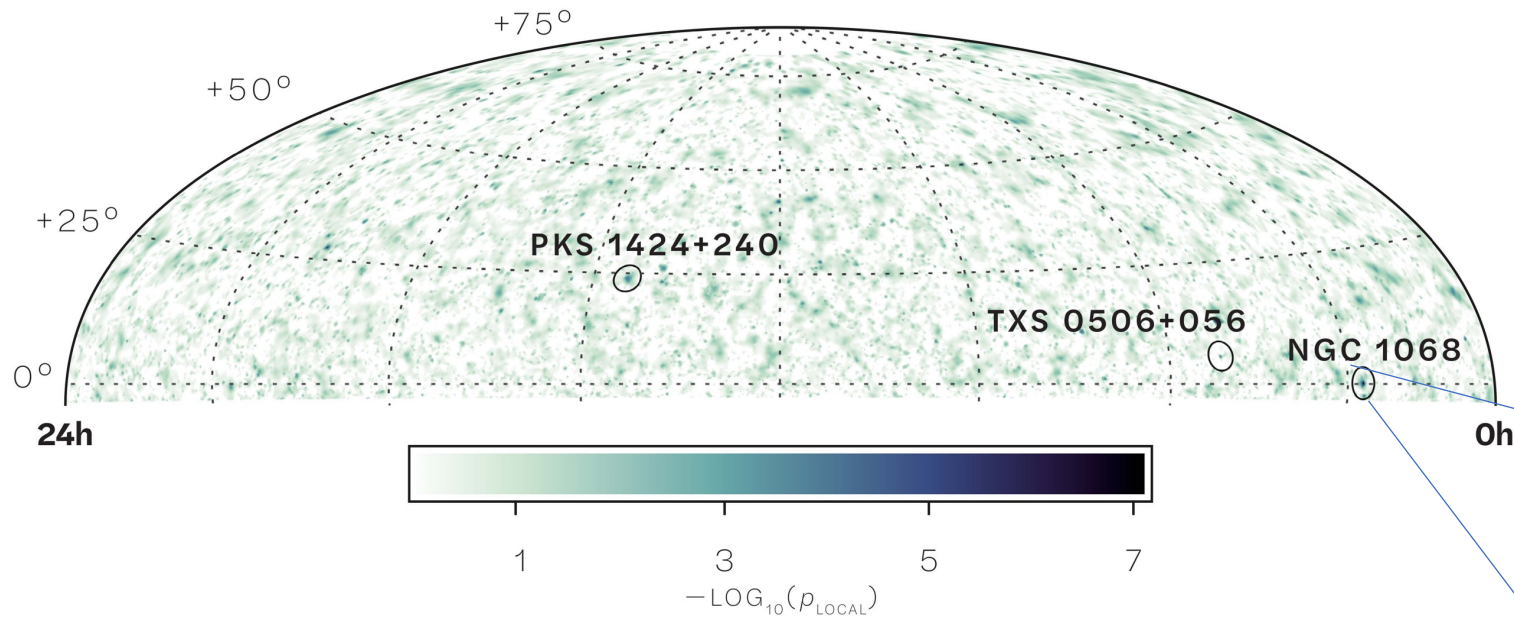
On-going: study spectrum for different bubble regions





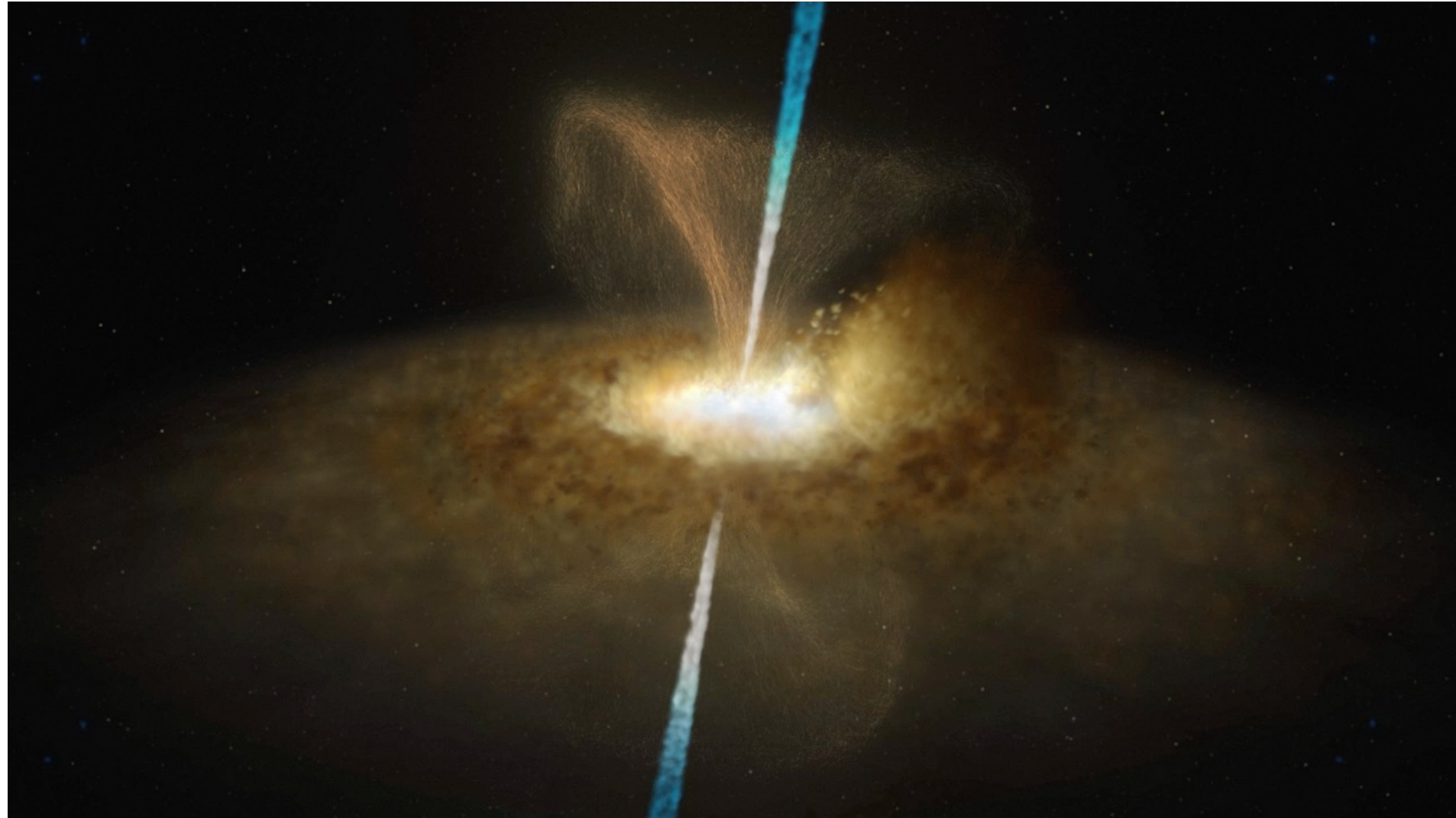
~10% of IceCube's
astrophysical
neutrinos

Seyfert Galaxies – Neutrino Sources?

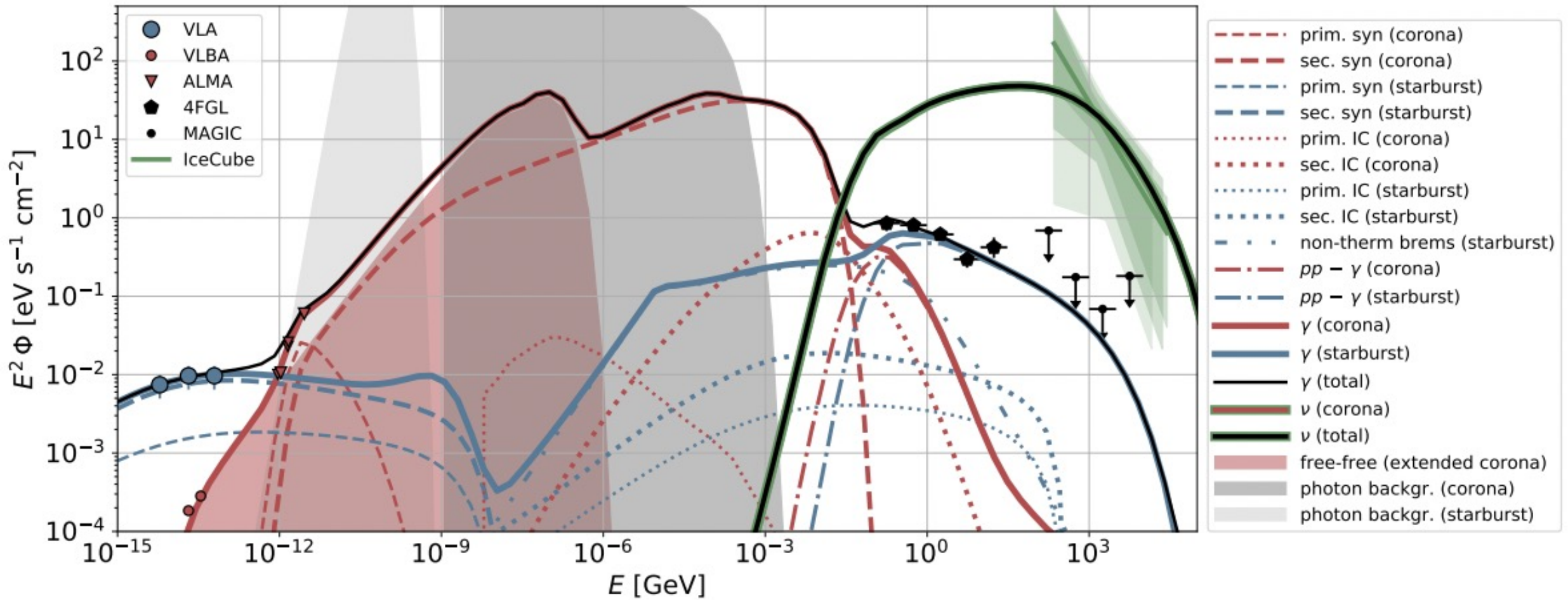


IceCube
Collaboration,
Science 2022

Seyfert Galaxies

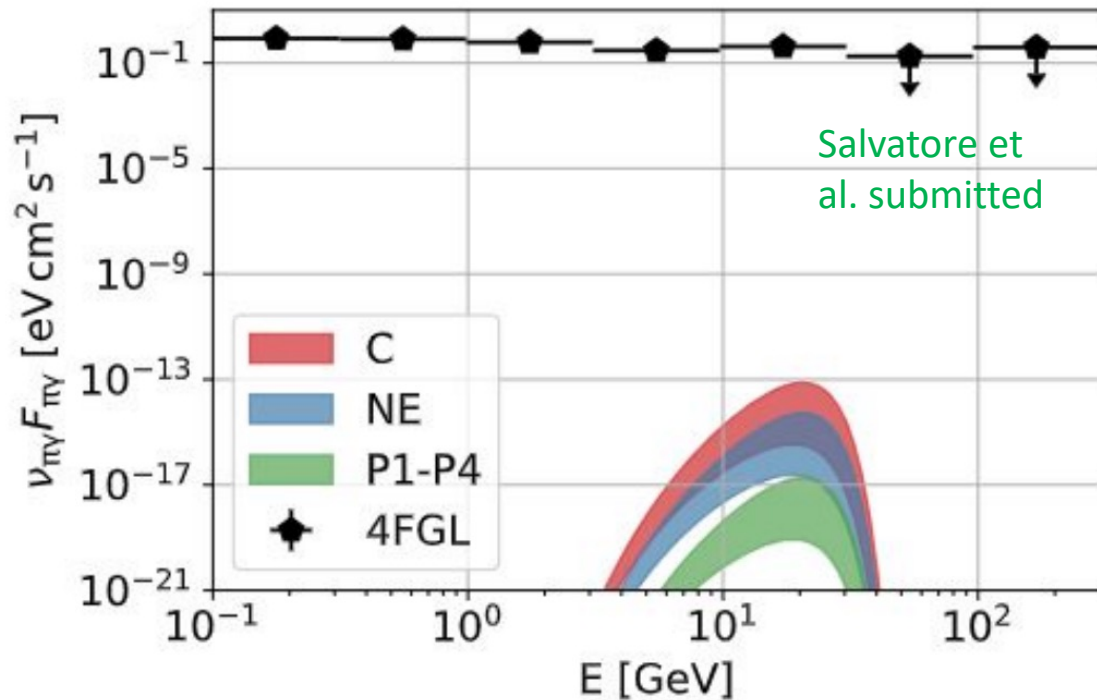


Credit: ESO/L. Calçada and M. Kornmesser



Study of jet contribution using AM³ code

→ jet power negligible



Talk by Silvia Salvatore

CRPropa ready to be used as well

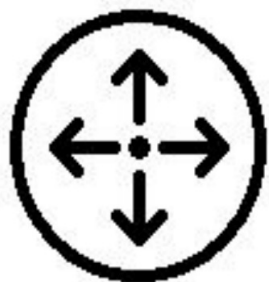
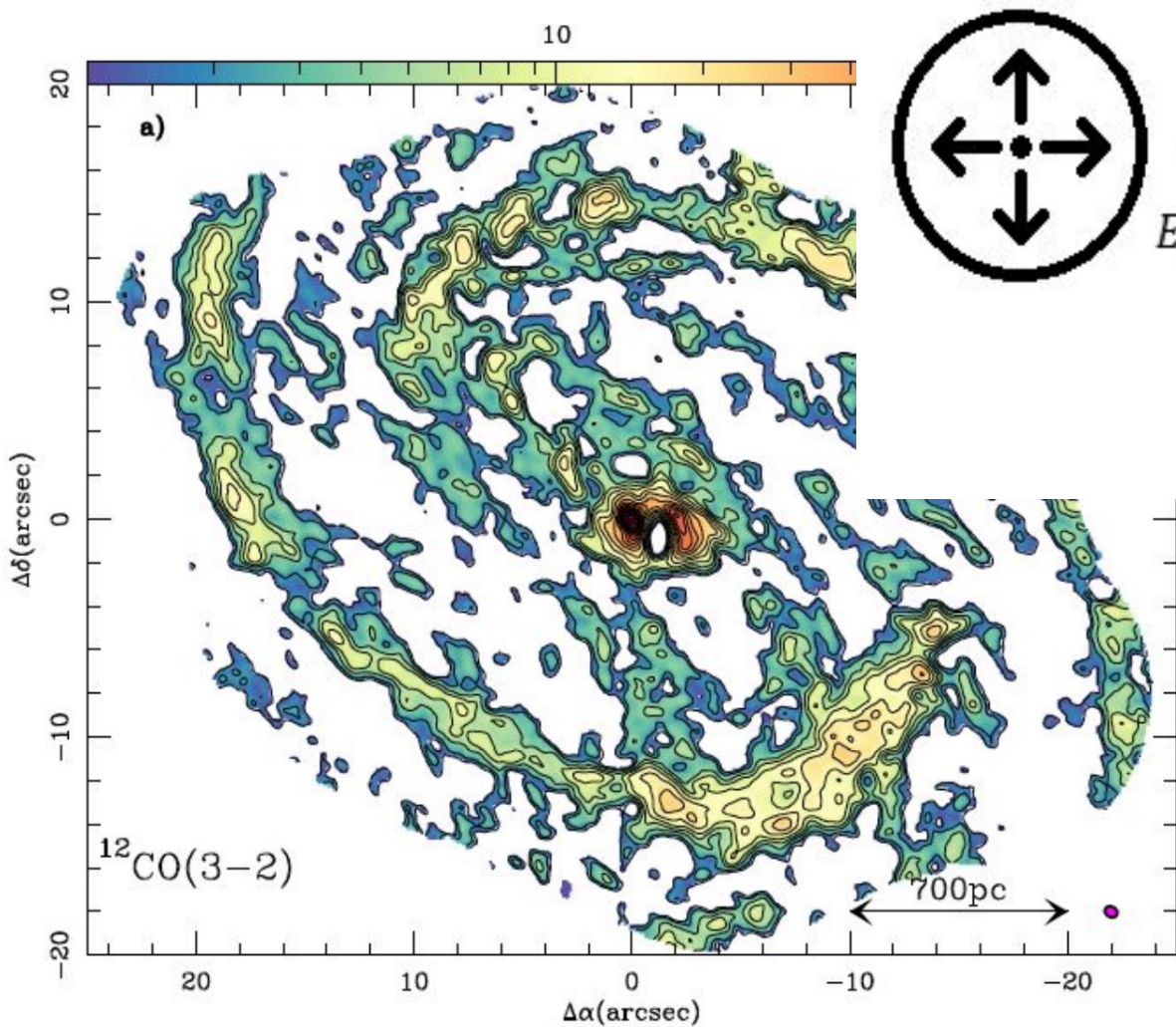
A7

A3

Talks by Julien Dörner & Marcel Schroller

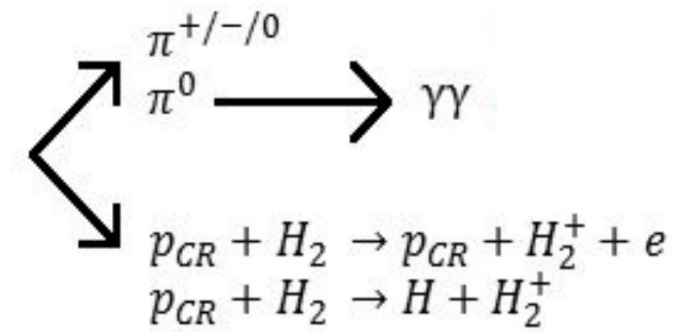
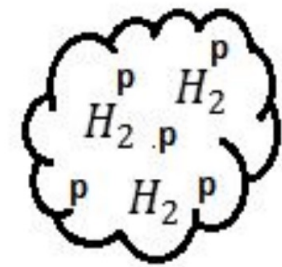
SFB supported workshop for comparison of leading numerical leptohadronic modeling codes

<https://indico.uni-wuppertal.de/event/230/>



$E_{max} = 10^{15} \text{ eV}$

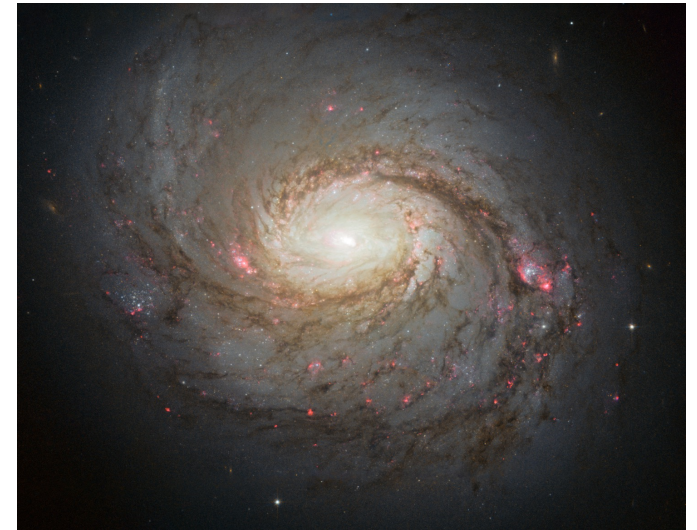
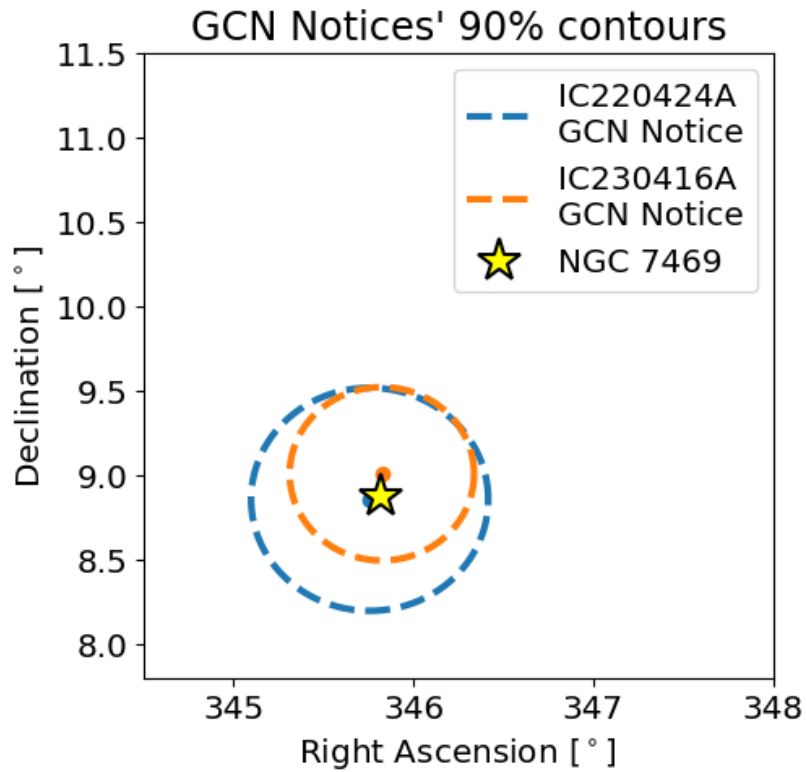
p



$\longleftarrow H_3^+, H_2D^+, HCO^+, HC_3NH^+, C_6H^-, \dots$
excited in rotation and vibration \longleftarrow

Connection to Chalmers: Study of CR ionization (vs photoionization)

Surprise: Two 100 TeV Neutrinos from Seyfert Galaxy NGC 7469

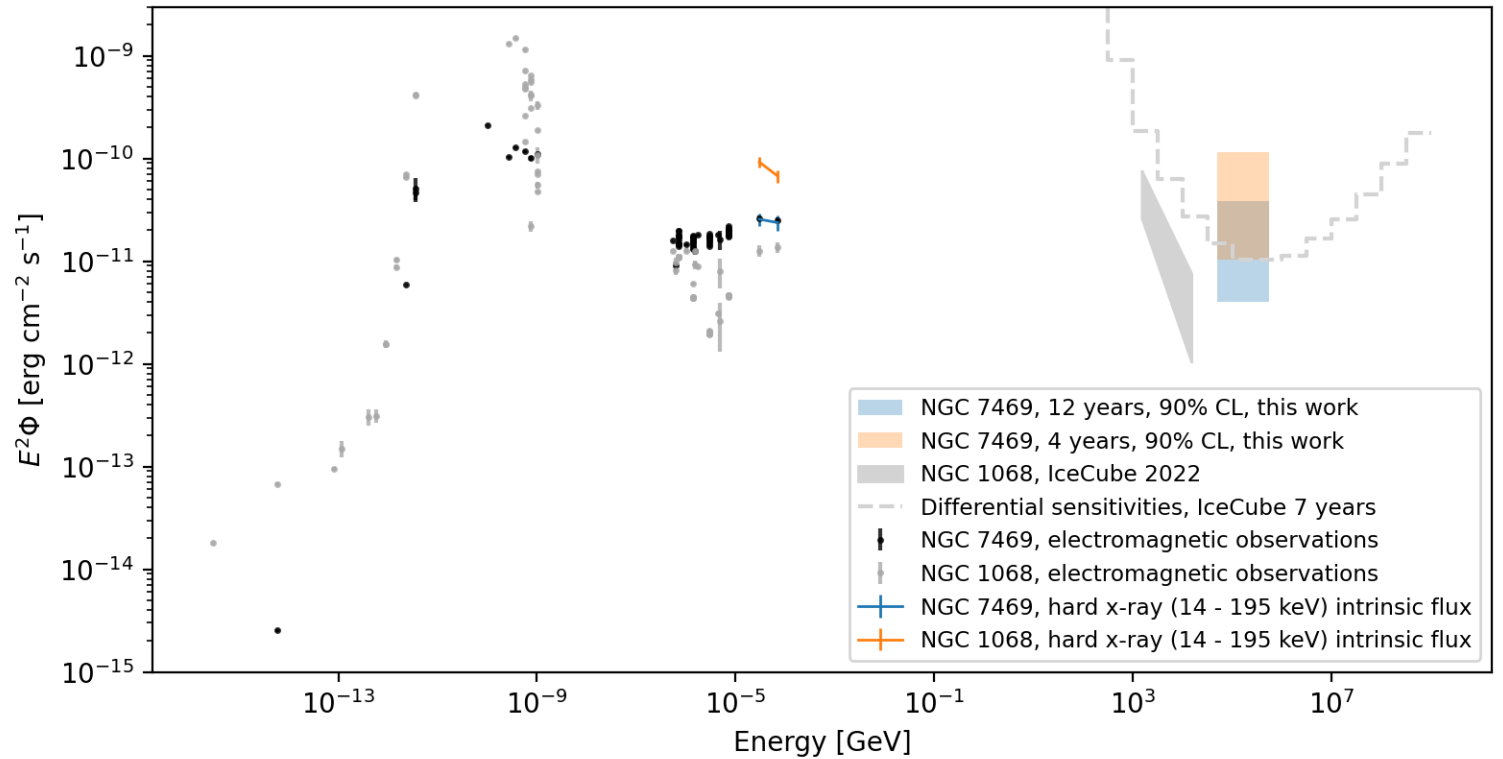
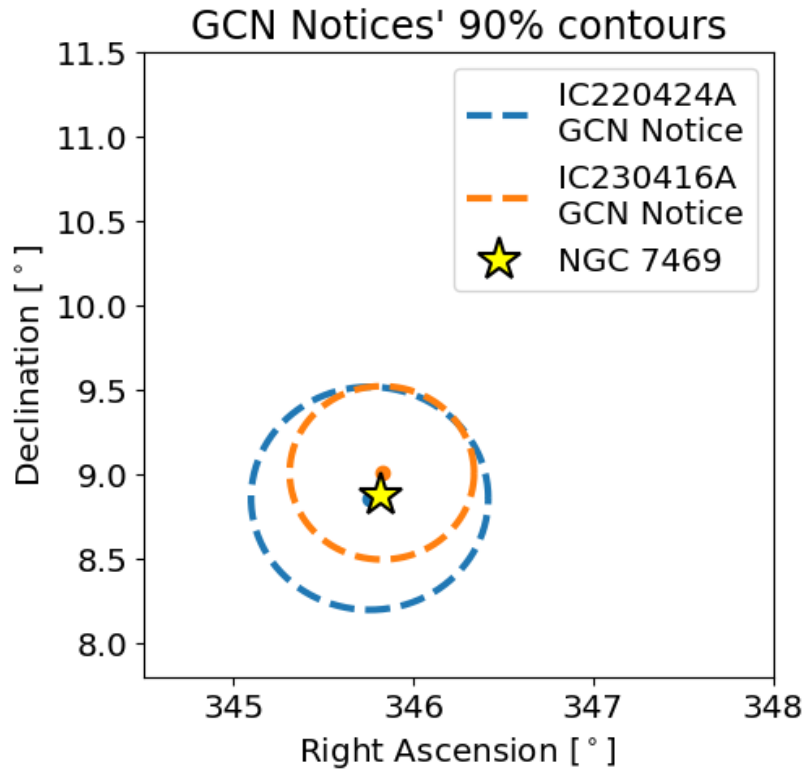


Talk by Giacomo Sommani

Estimated chance coincidence ~3.5 sigma

Sommani et al. in prep

Surprise: Two 100 TeV Neutrinos from Seyfert Galaxy NGC 7469



Talk by Giacomo Sommani

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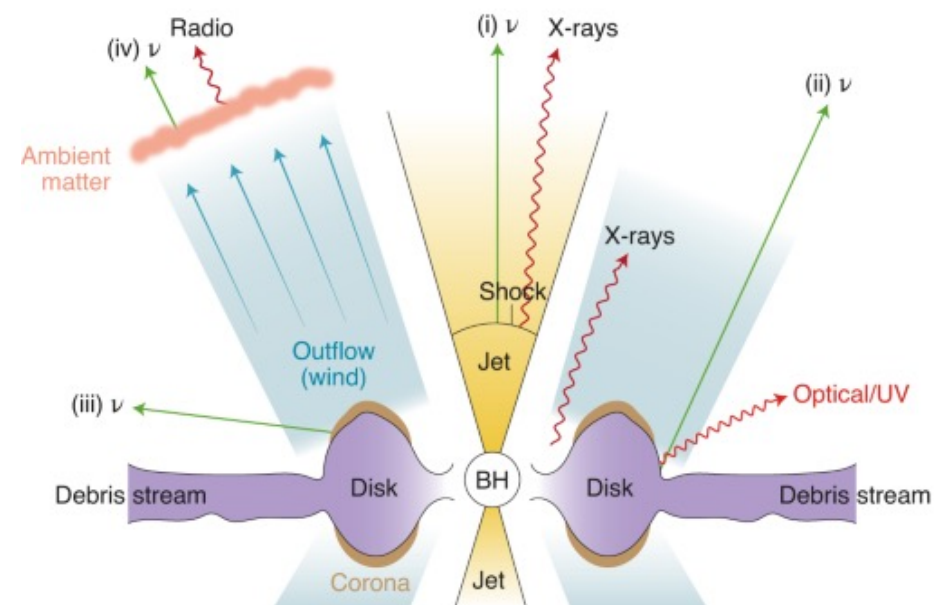
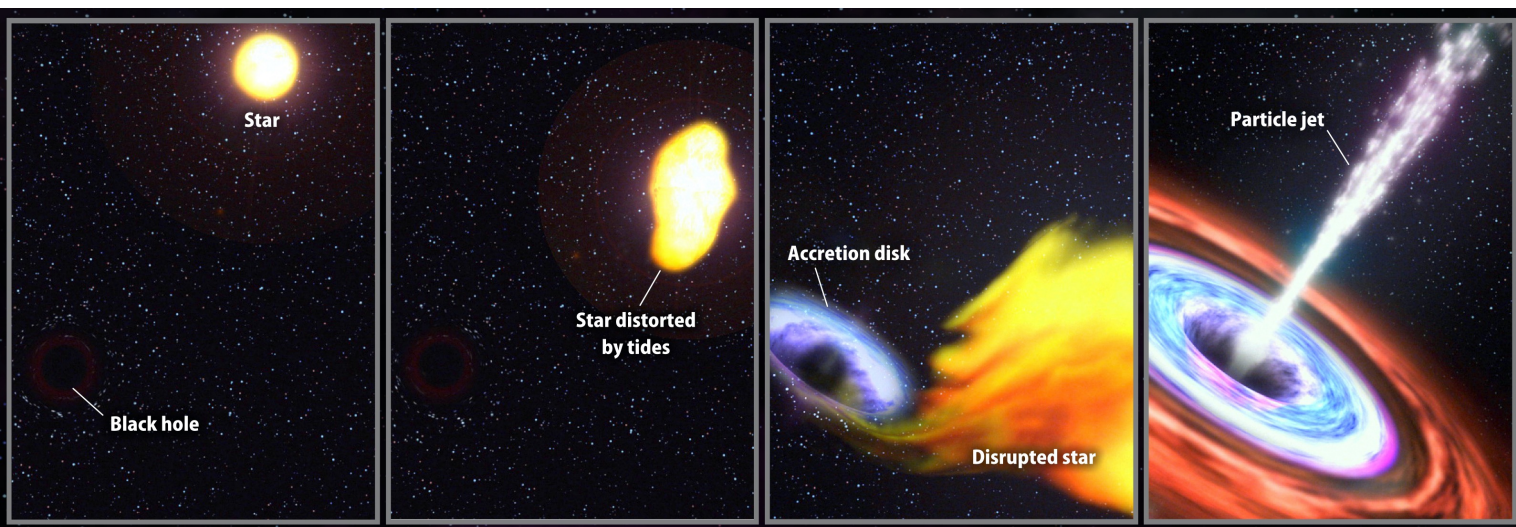
Sommani et al. in prep

Plan: Model the multi-wavelength data is the same way as NGC 1068

Tidal Disruption Events



Credit: DESY, Science Communication lab

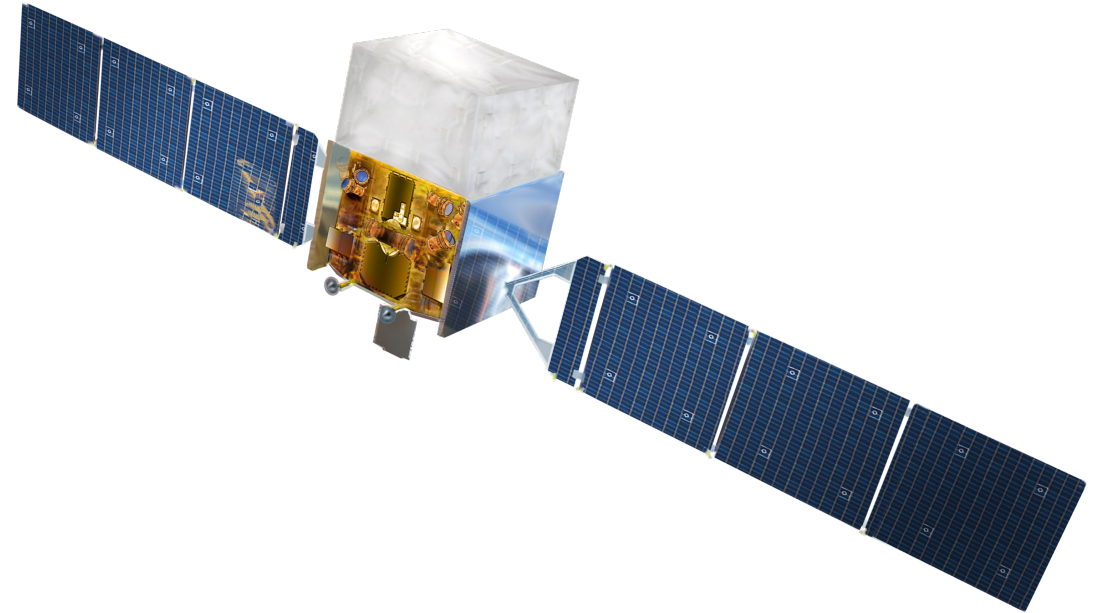


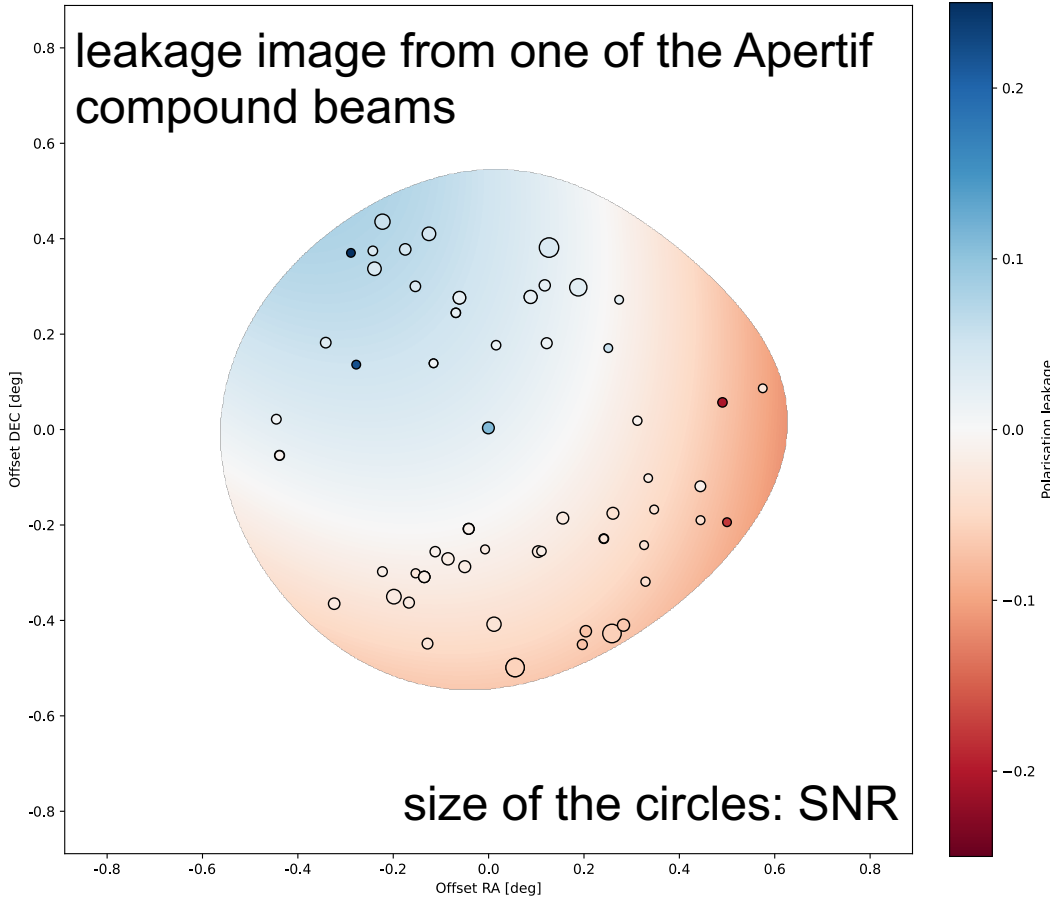
- Unique opportunity to study accretion disk (and jet) formation
- Candidate neutrino sources \rightarrow particle acceleration

Apertif survey → circular polarization

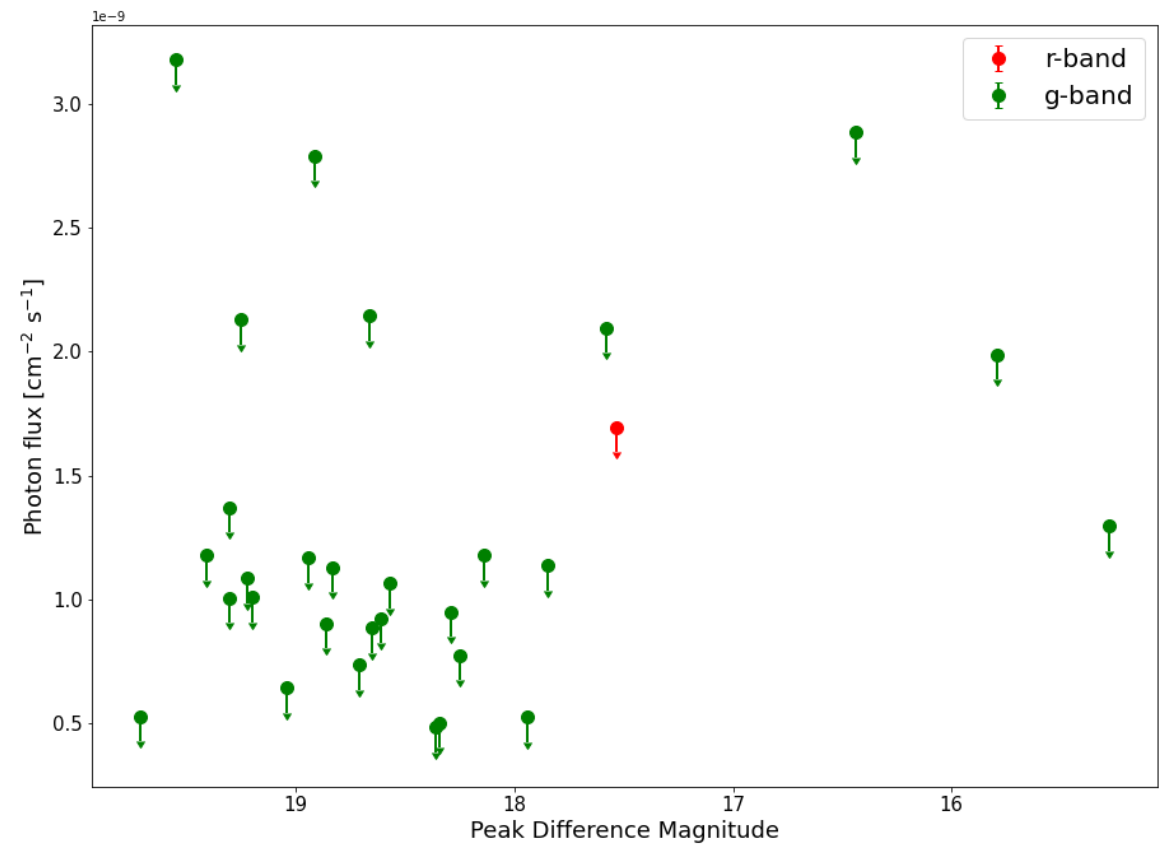


Fermi-LAT → gamma-ray time evolution



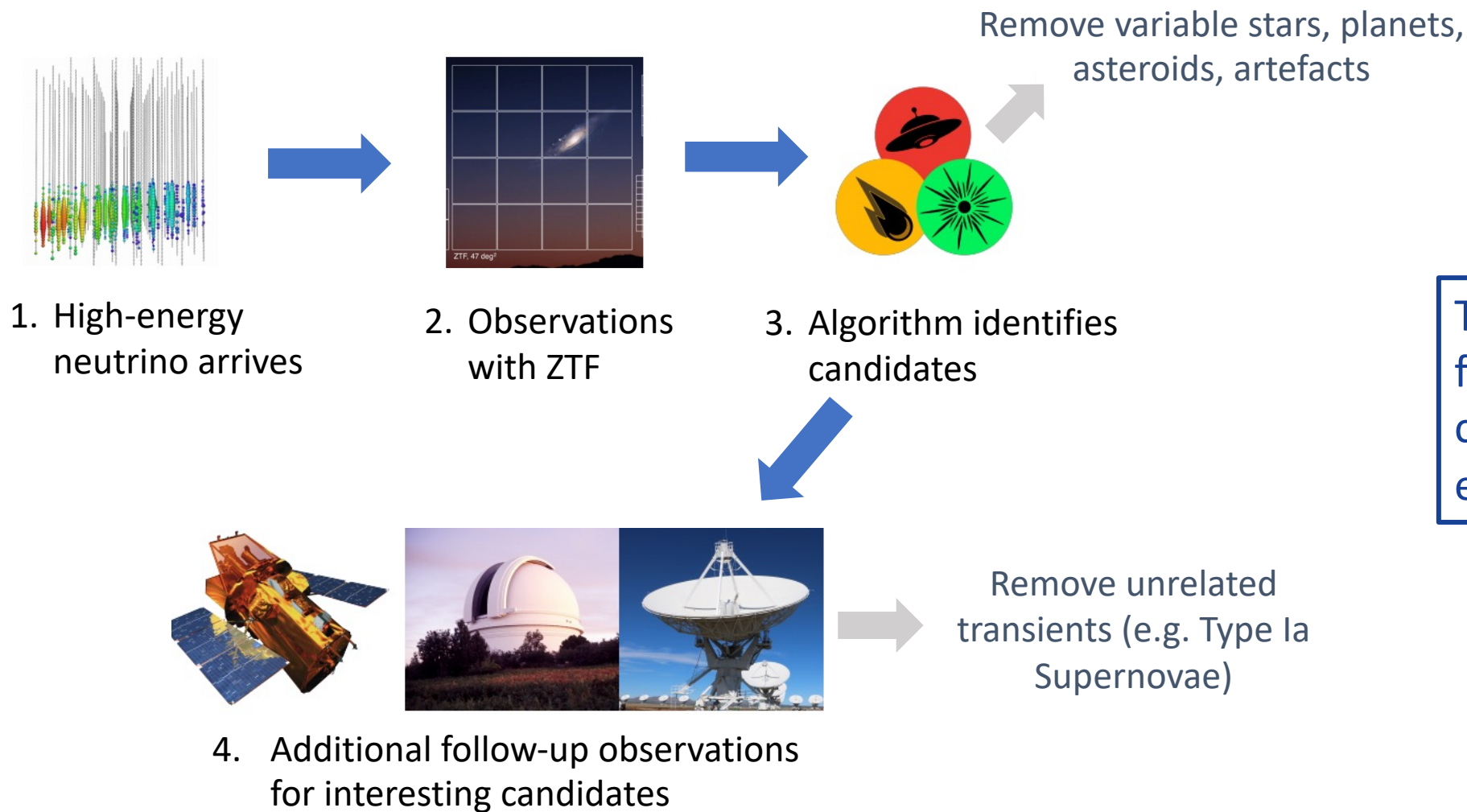


Apertif survey: leakage response needs to be estimated → Still waiting for full circular polarization catalog



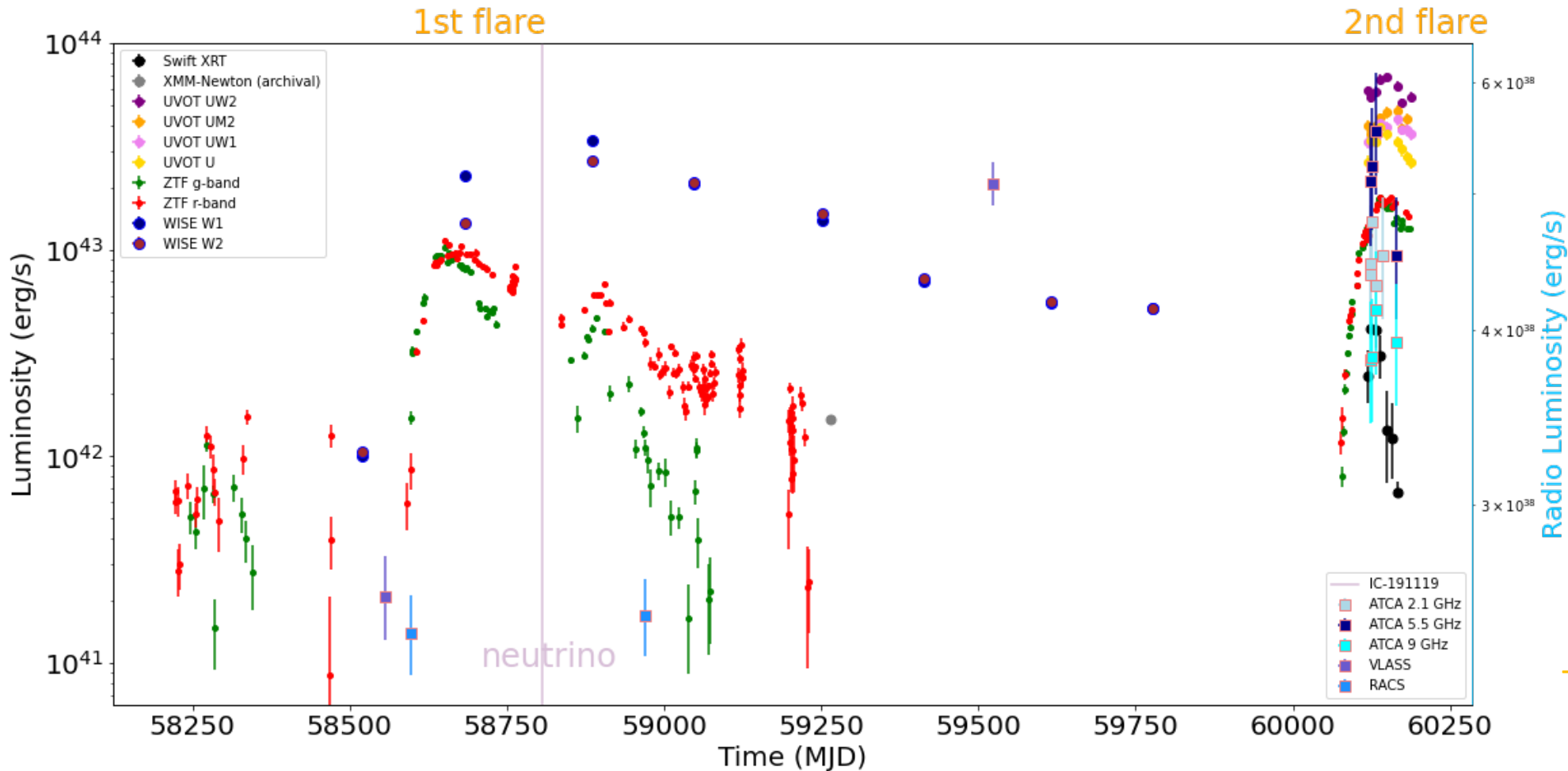
Search for gamma-rays from optically detected TDEs → upper limits, relevant to constraints on jet properties
Veres et al. in prep

Tidal Disruption Events – Optical follow-up of neutrinos



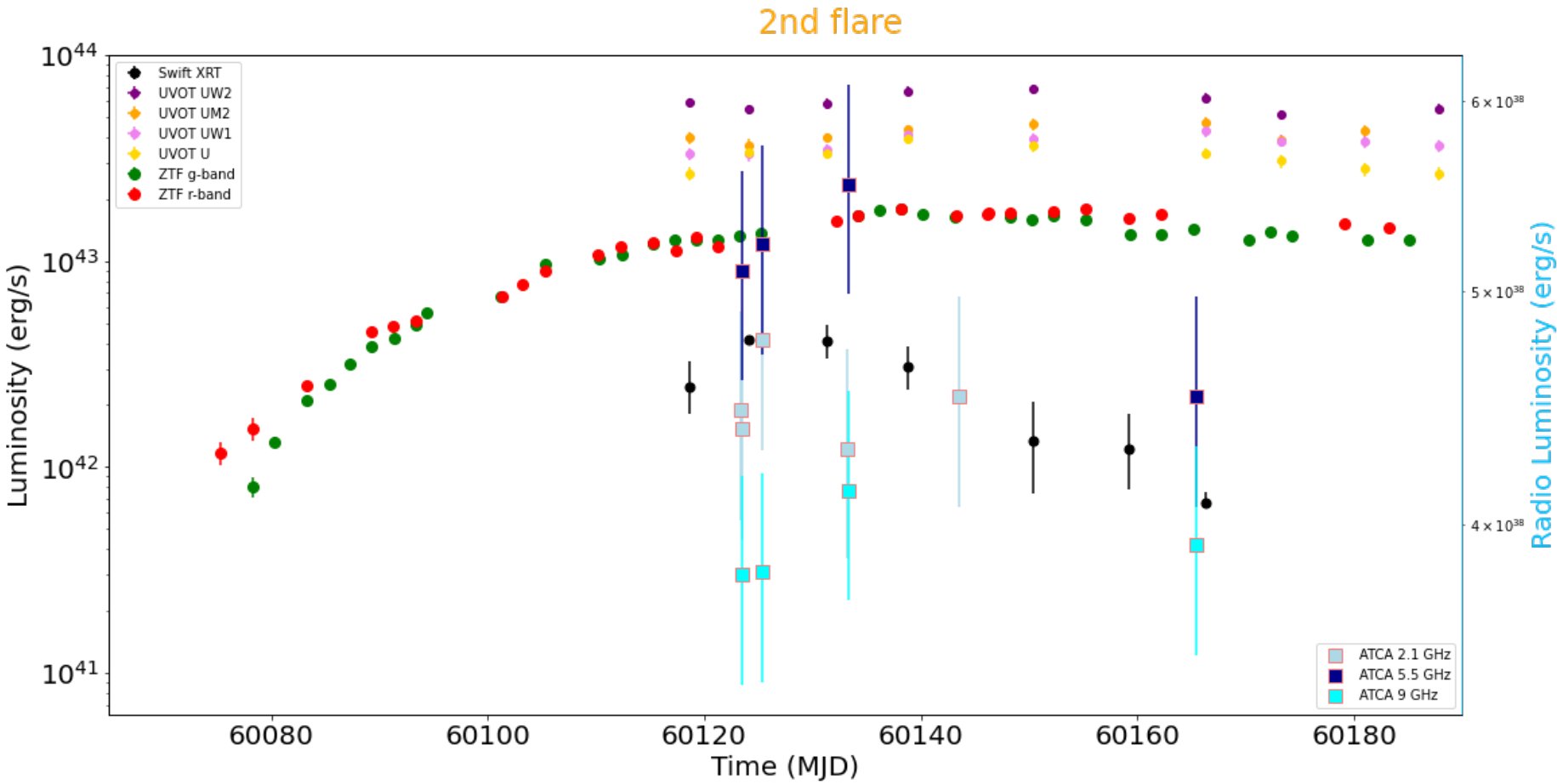
Three TDE candidates found in spatial coincidence with high-energy neutrinos

Another surprise: Second Flare from AT2019aalc („Lancel“) – Repeating TDE?



Talk by Patrik Veres

Another surprise: Second Flare from AT2019aalc („Lancel“) – Repeating TDE?



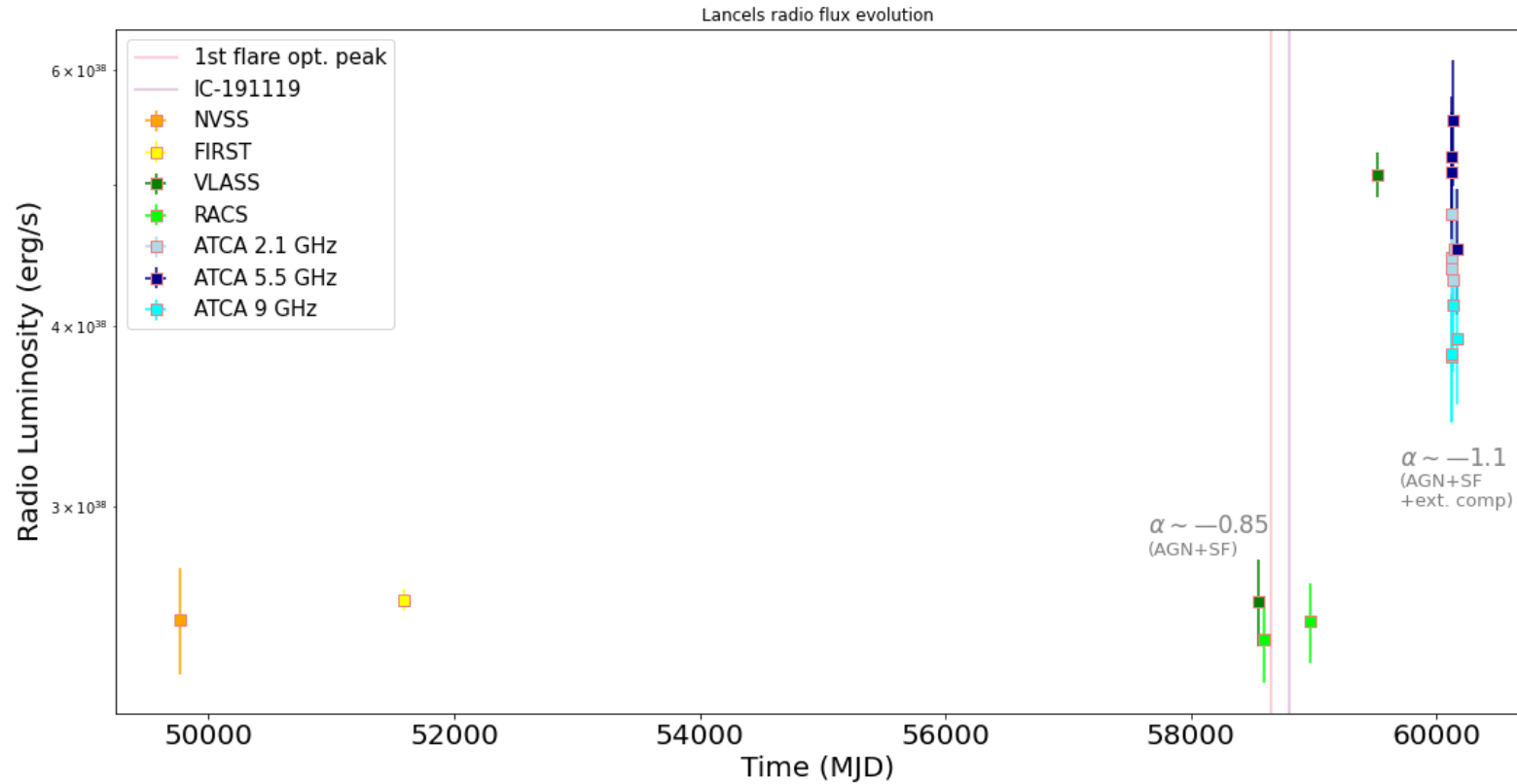
Initiated large multi-messenger campaign (lead by RUB)

Is it a repeating TDE or just “normal” AGN variability?

Talk by Patrik Veres

Veres et al. in prep

Another surprise: Second Flare from AT2019aalc („Lancel“) – Repeating TDE?



- Extensive radio observations by ATCA indicates long-lasting outflow
- EVN long-baseline observations (source detected, hint for outflow, second proposal submitted)

- MHD simulations of TDEs
- New student, Luke Conmy started Nov. 1 → modeling the disruption phase
- Postdoc Vardan Elbakyan Modeling → modeling the accretion phase
- Challenges:
 - Numerical: Transition from hydrostatic initial condition to extremely dynamic evolution
 - Scientific: Connecting to A6 most likely requires modeling the final accretion event as well



The Large Array Survey Telescope



Photometry survey: 32 telescopes (out of 48) installed in Israel, one mount equipped with RUB polarization filters

→ First verification of the system through measurements of standard polarized and non-polarized stars

4-telescope polarization prototype at RUB observing platform under construction (thanks to SFB funding)

Goal: AGN monitoring

E. Ofek et al. „The Large Array Survey Telescope -- System Overview and Performances”, PASP 135, 1048 (2023)

S. Ben-Ami et al. „The Large Array Survey Telescope -- Science Goals “, PASP 135, 1050 (2023)

Summary

- Great efforts to bring together
 - Observers (e.g. radio, optical, gamma-rays, neutrinos)
 - Observers and theorists (e.g. modeling of NGC 1068)
 - Particle and astroparticle physics (CRPropa)