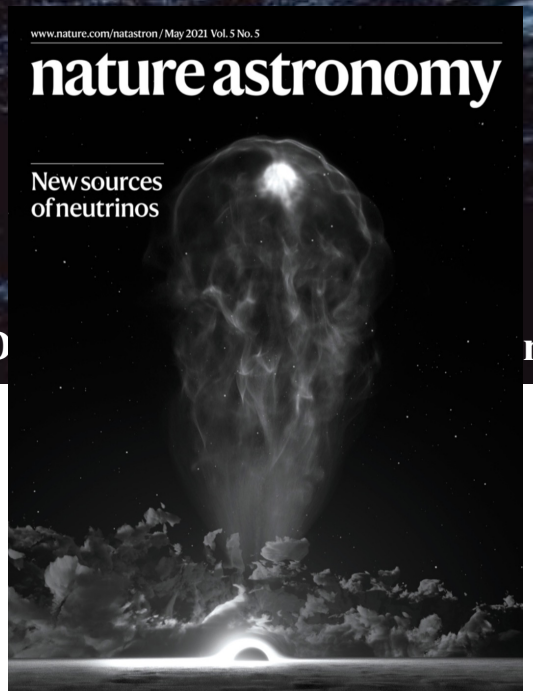
Theoretical interpretation of the observed neutrino emission from TDEs



Walter Winter[1] and Cecilia Lunardini[2]
[1]DESY, Zeuthen, Germany
[2]Arizona State University, Tempe, AZ, USA

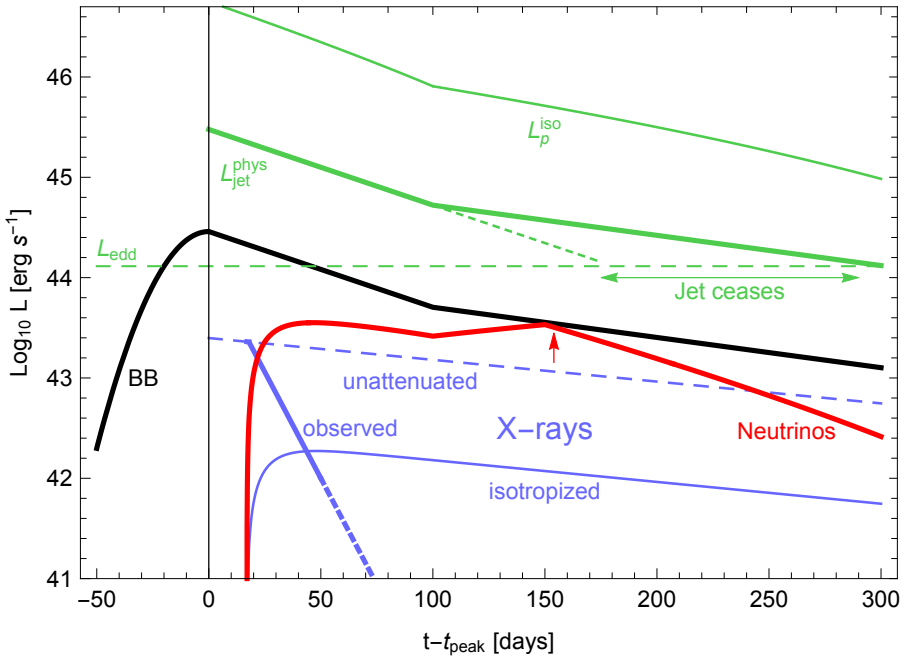
ICRC 2021, originally planned for Berlin, featured by Zeuthen, #online
July 2021

HELMHOLTZ RESEARCH FOR GRAND CHALLENGES

Where are the neutrinos produced?

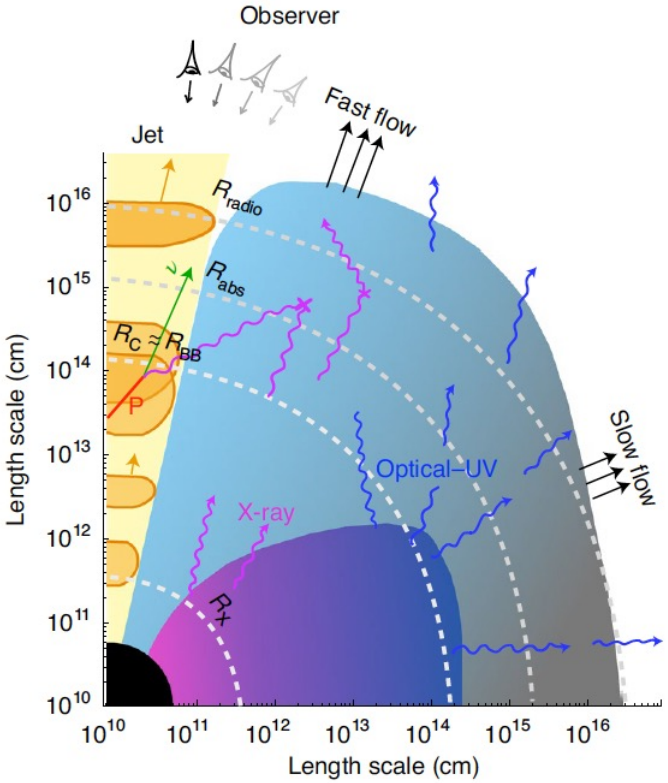
Considerations:

- Neutrino energy → need efficient CR acceleration site,
  right target photon energies (X-rays)
- Energetics (energy transfer into neutrinos)
- Delay of neutrino signal (150 days after peak)



One possible solution:

- A *jetted* concordance scenario with a jet hitting external radiation back-scattered in outflow
- Neutrino delay given by size of system/time the outflow needs
- Connection with X-ray observation
- Satisfies energetics for small BH mass, $M_{SMBH} = 10^6\ M_\odot$
- Caveat: clear jet signatures (still) missing



Winter, Lunardini, Nature Astronomy 5 (2021) 472; see also Liu, Xi, Wang, 2020; Murase et al, 2020; Hayasaki, Yamazaki, 2019

Want **technical details**?
→ slides, proceedings (esp. energetics)

Want **non-technical intro**?
→ see video; stay alert for special effects!