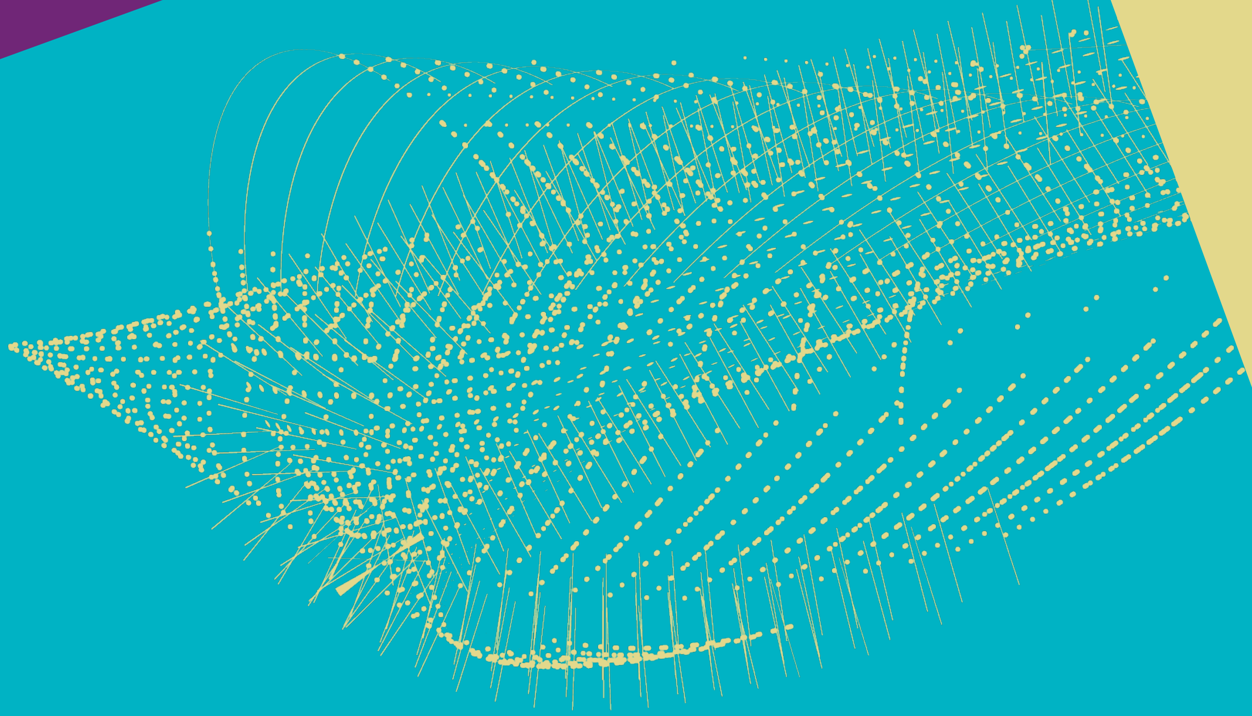
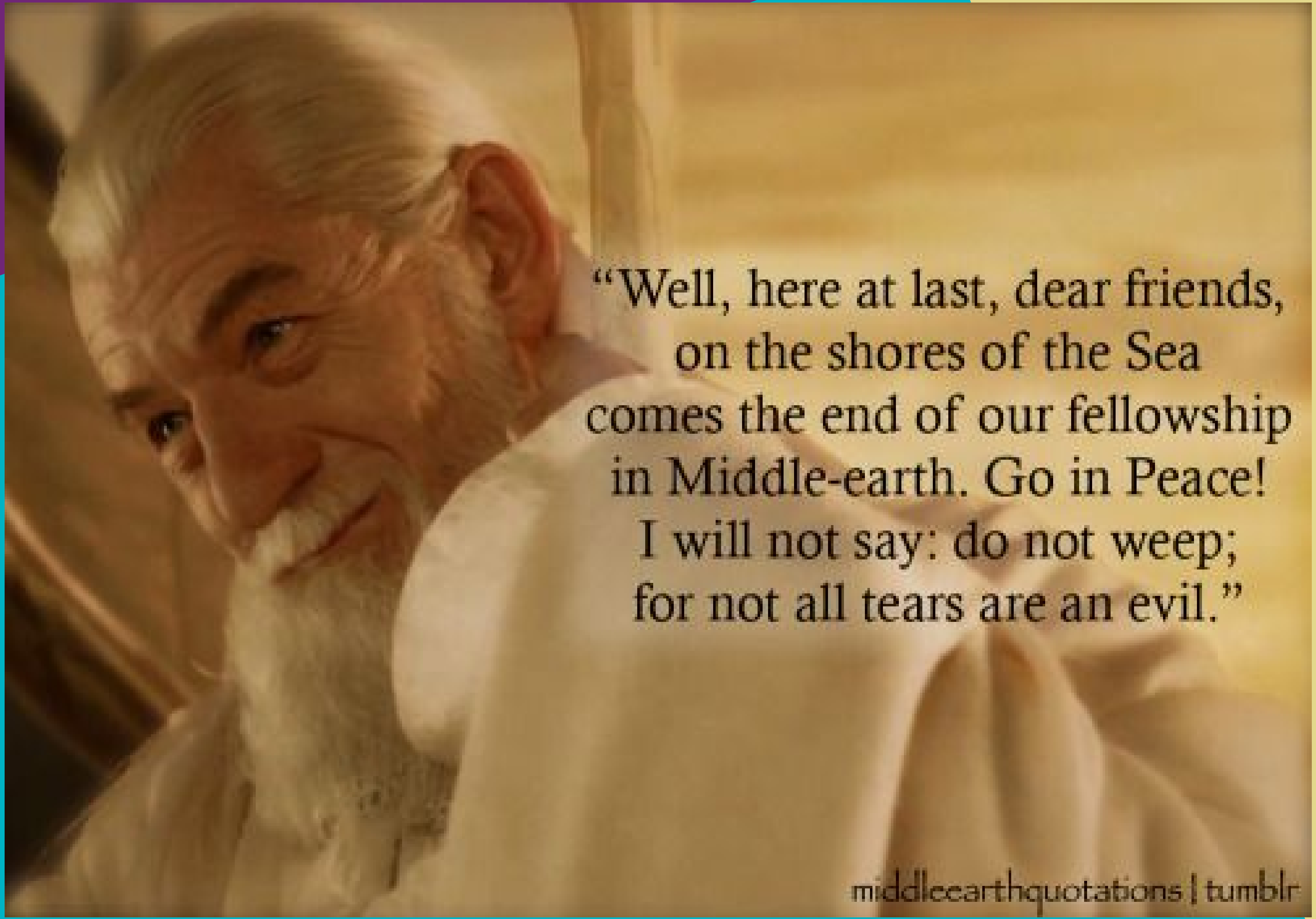
Nikhef

19 Sept 2019



GROUPMEETING

Rasa Muller



THANKS BRIAN!

TRY NEW SETUP

Week 1: regular groupmeeting

Week 2: **paper meeting**

Week 3: regular groupmeeting

Week 4: **junior meeting**

TRY NEW SETUP

Week 1: regular groupmeeting

Week 2: **paper meeting**

Week 3: regular groupmeeting

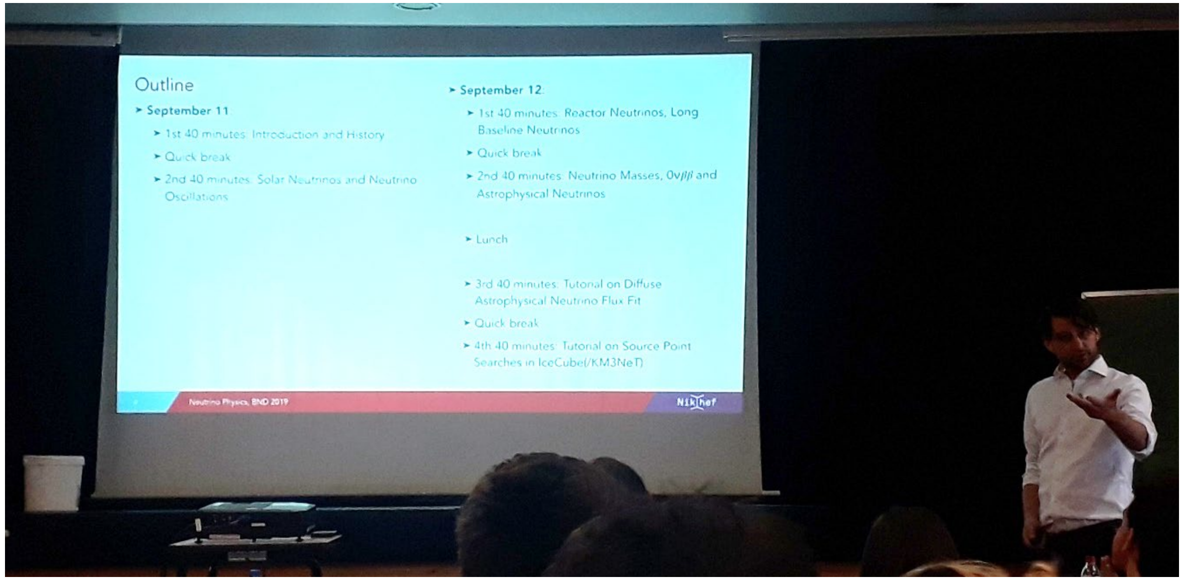
Week 4: **junior meeting**

Nikhef

BND

- Quantum field theory
- Electroweak theory
- Graviatational waves
- Electroweak experiments
- Tracking
- Flavour physics
- Long lived particles
- Cosmology
- Neutrino physics

Daan



CATALOG SEARCHES

1) What sources emit High Energy neutrinos? What other signals do they emit?
2) Which experiments/telescopes detect all these signals?
3) How is this info stored in catalogs?
4) What are the most relevant catalogs? How complete are they (upto which redshift)?

CATALOG SEARCHES

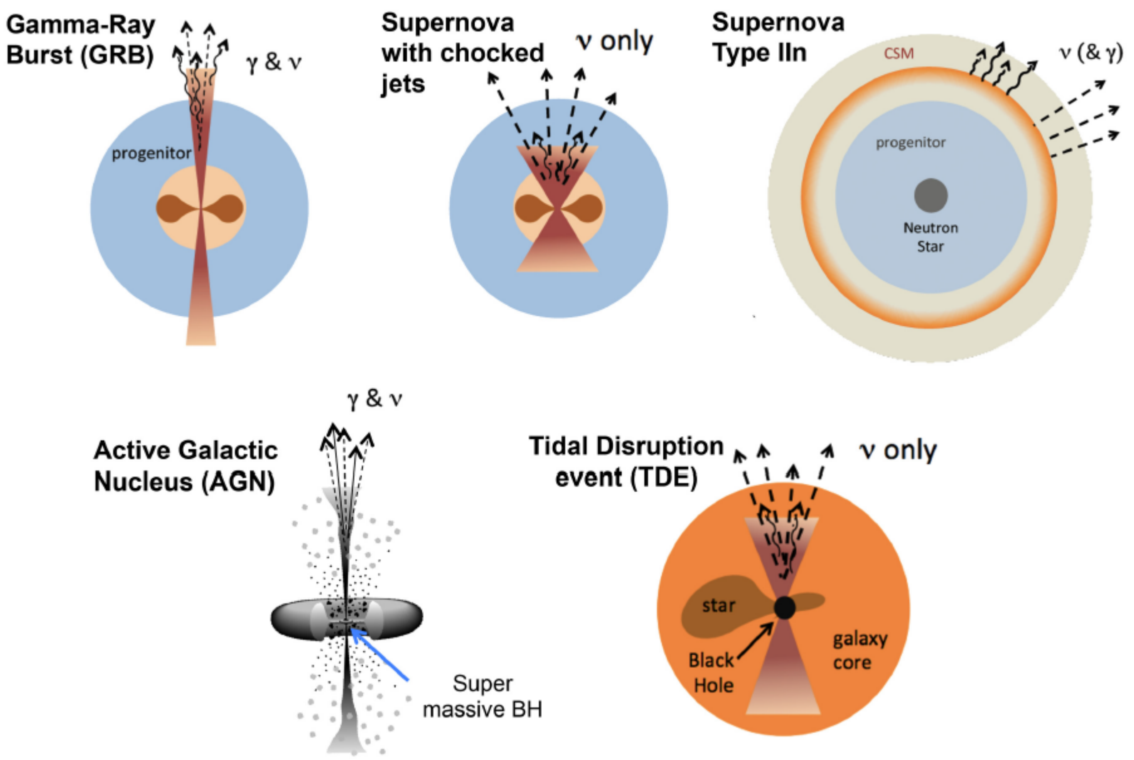


Figure 2. Scenarios for sources of neutrinos, with varying degrees of jet formation.

<u>Multimessenger astronomy:</u>

The exploration of the Universe through combining information from a multitude of cosmic messengers

I. cosmic rays
II. gravitational waves
III. electromagnetic radiation
IV. neutrinos

1) What sources emit High Energy neutrinos? What other signals do they emit?

Nikhef

CATALOG SEARCHES

I. Cosmic rays

➔ Detector for atm particle showers + accompanying fluorescence and Cherenkov radiation

PierreAugier

II. Gravitational waves

LIGO/VIRGO and others

III. Electromagnetic radiation

➔ *γ-ray, X-ray unable to cross Earth's atmosphere thus primarily observed using satellites*

- *Fermi LAT*
- Imaging Atmospheric Cherenkov Telescope (IACT) systems
  - i. H.E.S.S.
  - ii. FACT
  - iii. VERI-TAS
  - iv. GFU

2) **Which experiments/telescopes detect all these signals?**

CATALOG SEARCHES

1) What sources emit High Energy neutrinos? What other signals do they emit?
2) Which experiments/telescopes detect all these signals?
3) **How is this info stored in catalogs?**
4) **What are the most relevant catalogs? How complete are they (upto which redshift)?**

→ Generate pseudodatasets
→ Analyse pseudo datasets

CATALOG SEARCHES WITH KM3NET

PHYSICAL REVIEW D **96**, 023003 (2017)

Prospects of establishing the origin of cosmic neutrinos using source catalogs

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(Received 26 November 2016; published 14 July 2017)

The cosmic neutrino flux recently discovered by IceCube will be instrumental in probing the highest-energy astrophysical processes. Nevertheless, the origin of these neutrinos is still unknown. While it would be more straightforward to identify a transient, or galactic source, class, finding a population of distant, continuous sources is challenging. We introduce a source-type classification technique that incorporates all available information from catalogs of source candidates. We
establish the origin of cosmic neutrinos, even for the most challeng
AGN, or galaxy clusters–if neutrino track directions can be recons
show that the source catalog out to ~100 Mpc can be sufficien
allowing for more straightforward source surveys. We also characte
angular resolution, size, and veto power in order to understand the

DOI: 10.1103/PhysRevD.96.023003

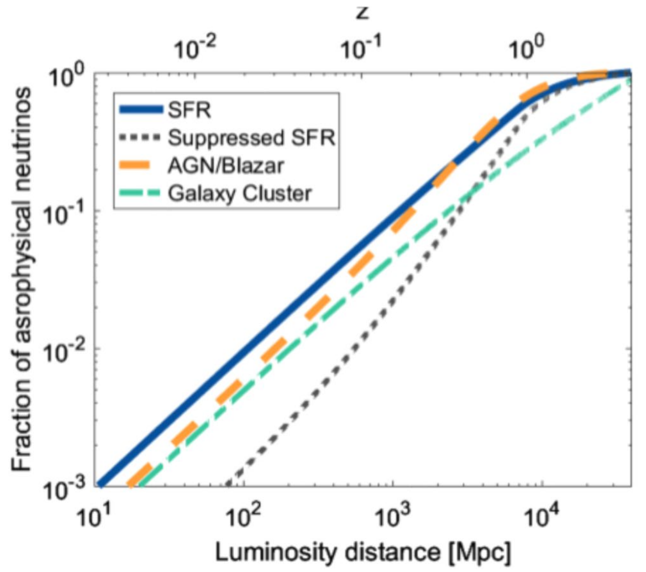

FIG. 1. Fraction of astrophysical neutrinos detected from sources within a luminosity distance, as a function of the luminosity distance, for different cosmic evolution models (see legend and Sec. II E). For comparison, the top axis shows the corresponding redshift.

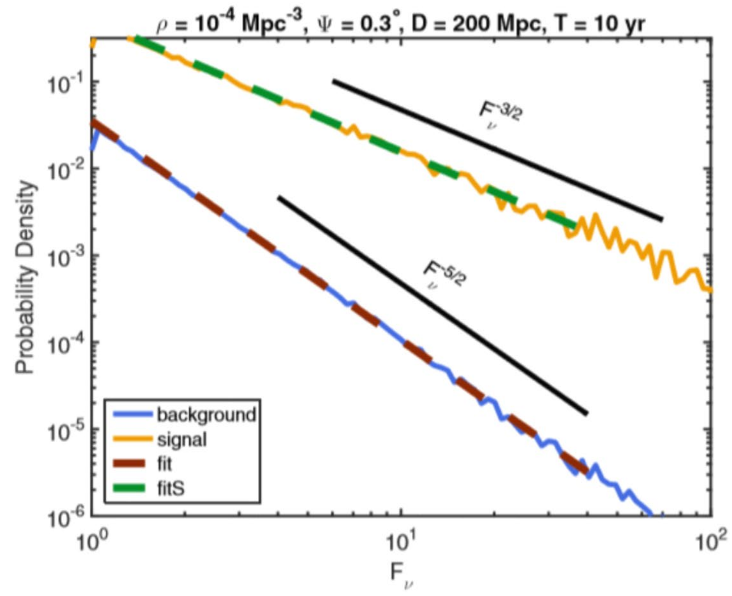

FIG. 2. Simulated distribution of neutrino flux $\mathcal{F}_\nu$ corresponding to signal and background neutrinos. This example shows the densities for $\psi = 0.3^\circ$, $d_{\rm th} = 200$ Mpc, for starburst galaxies. The dashed red line shows a power-law fit on the background density's tail. The black solid lines show power-law slopes with $\mathcal{F}_\nu{}^{-3/2}$ and $\mathcal{F}_\nu{}^{-5/2}$, the theoretical expectations for the signal and neutrino models, respectively, for the case in which the expected number of sources within $d_{\rm th}$ coincident with a neutrino is $\ll 1$.

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