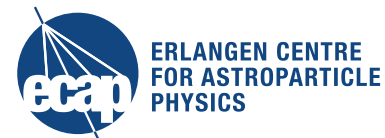


German high-energy neutrino strategy meeting

KM3NeT

Uli Katz & Claudio Kopper
Erlangen Centre for Astroparticle Physics
Friedrich Alexander University Erlangen-Nürnberg
10 January 2024





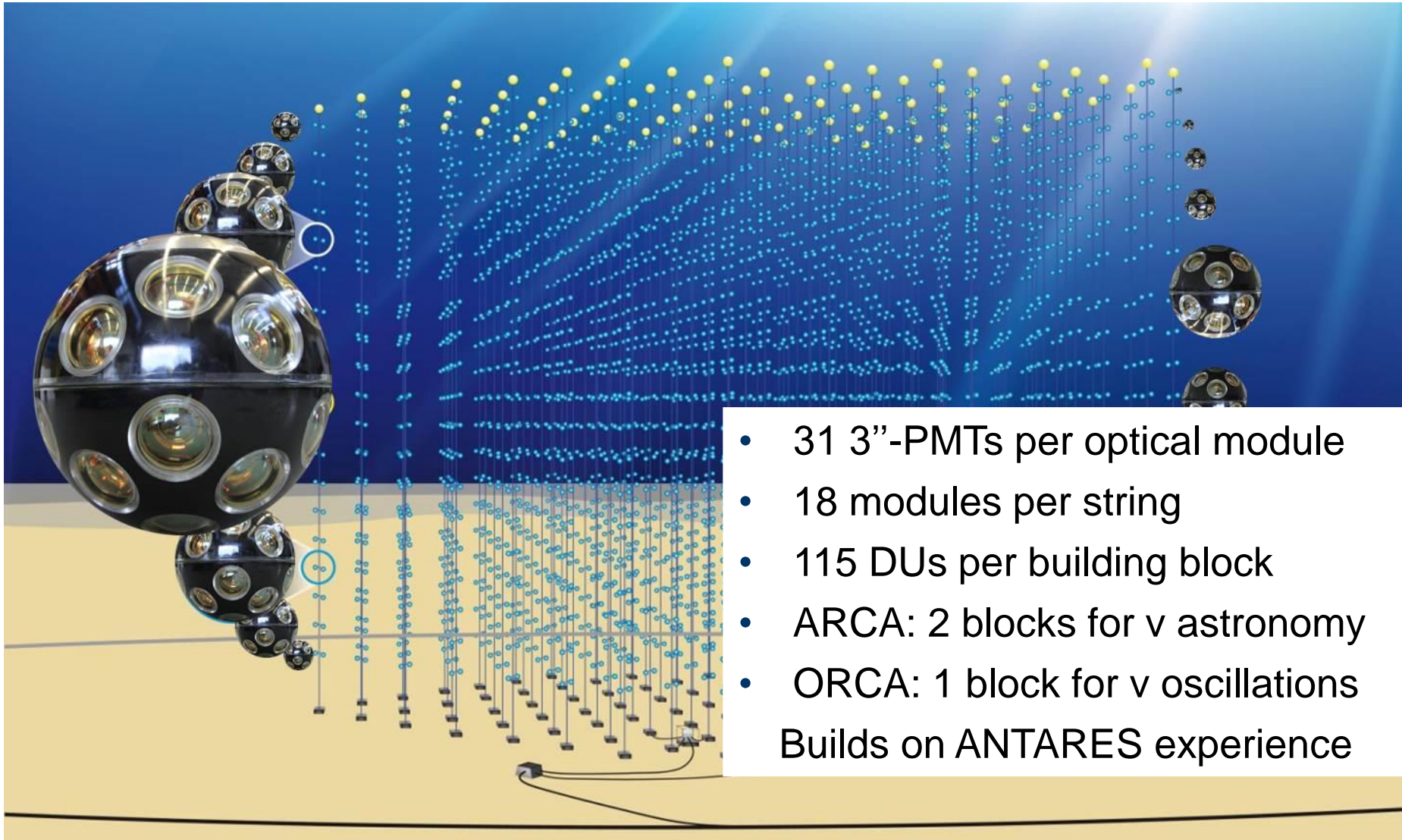
The plan for the next 10 minutes

- Technology and construction
- Highlight results
- Collaboration status + plans in Germany



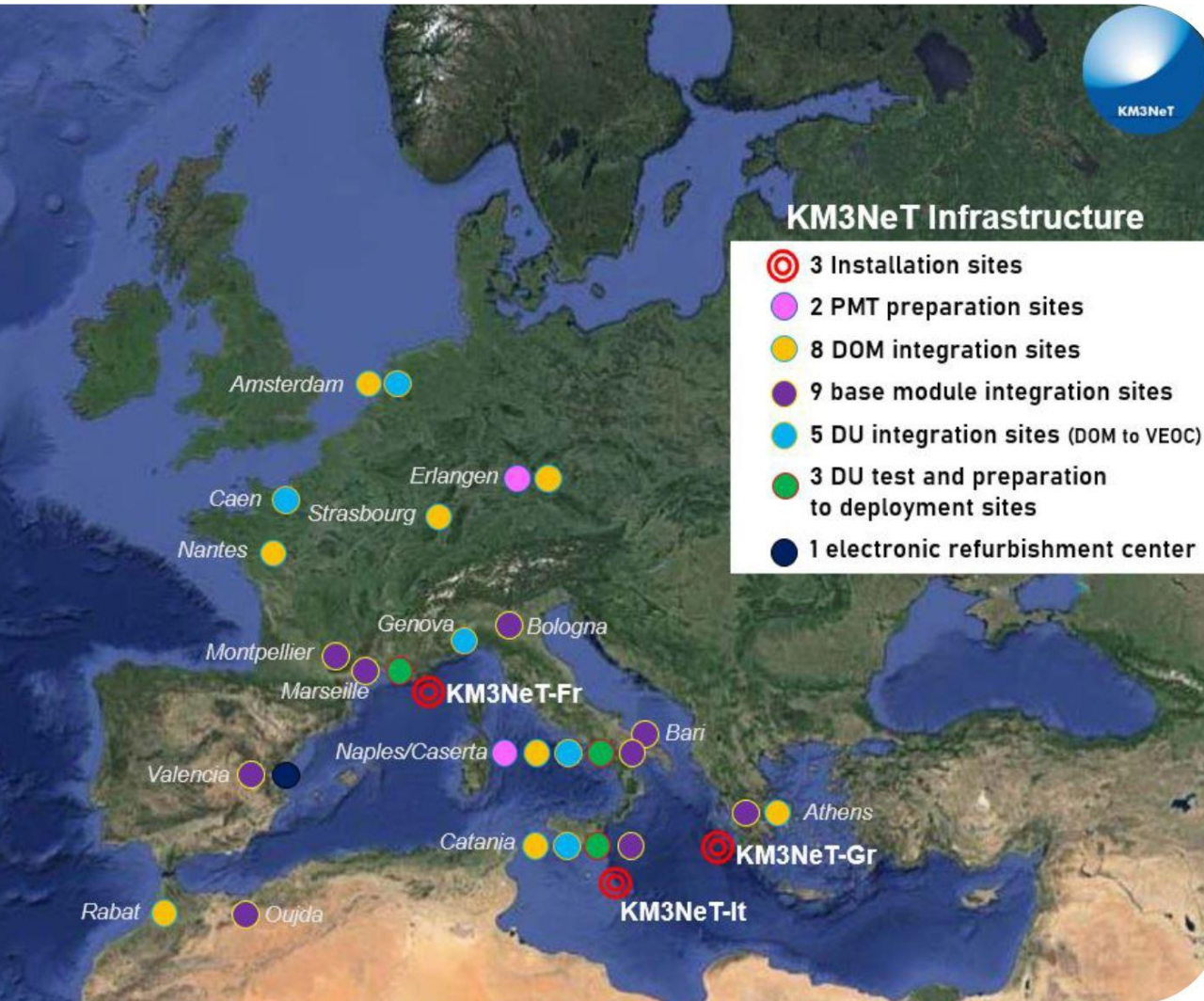
Technology and construction

In the Mediterranean Sea: KM3NeT



- 31 3"-PMTs per optical module
 - 18 modules per string
 - 115 DUs per building block
 - ARCA: 2 blocks for ν astronomy
 - ORCA: 1 block for ν oscillations
- Builds on ANTARES experience

Status of integration



DOMs

- 8 integration sites
- 1300 DOMs integrated
- 80 currently on bench

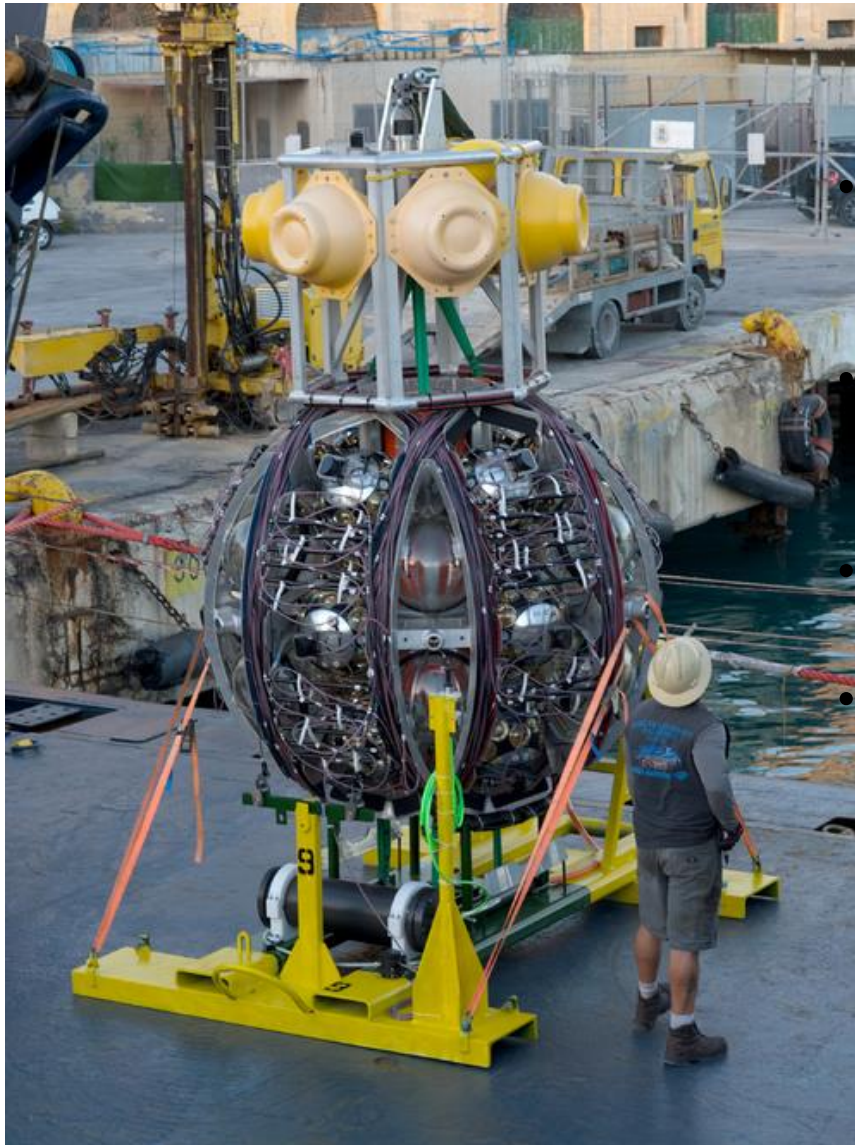
BMs

- 8 integration sites
- 66 BMs integrated
- 4 currently on bench

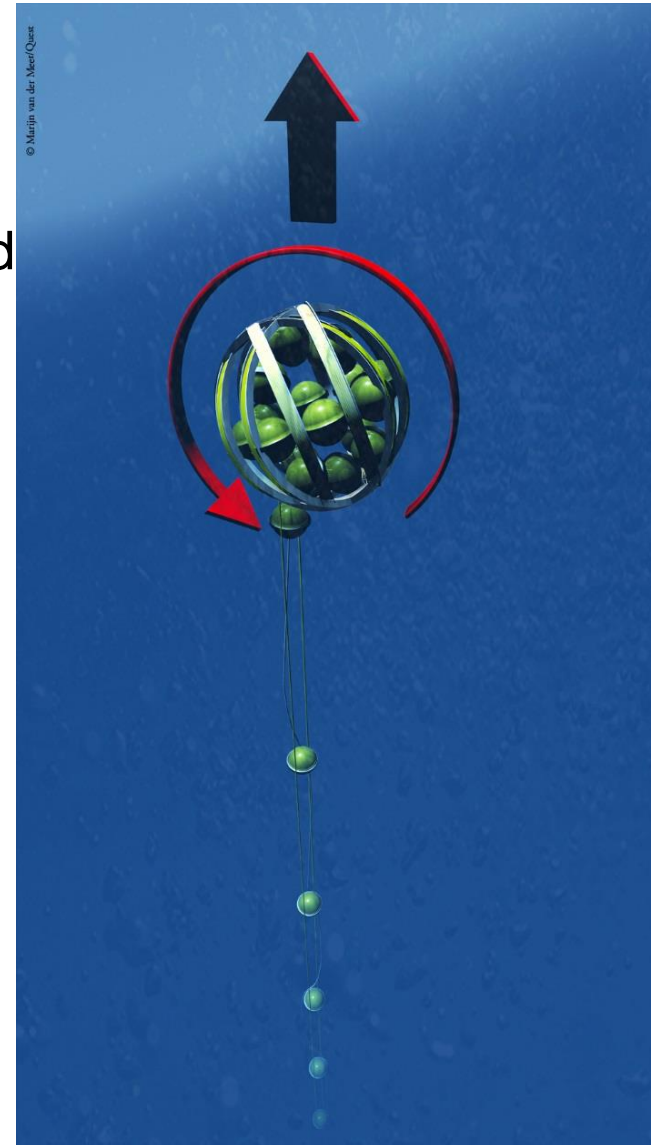
DUs

- 6 integration sites
- 56 DUs integrated
- 47 deployed

KM3NeT Deployment



- ← Deploy to sea bed
- Release by ROV
- Unfurl →
- Collect frame

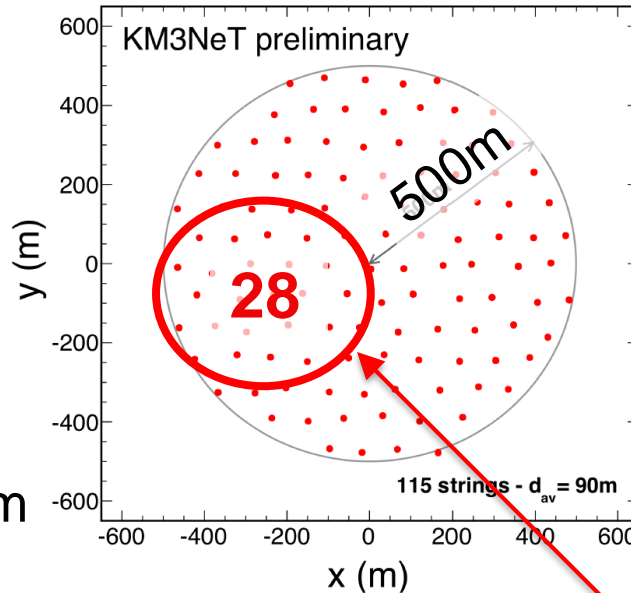


KM3NeT = ARCA and ORCA

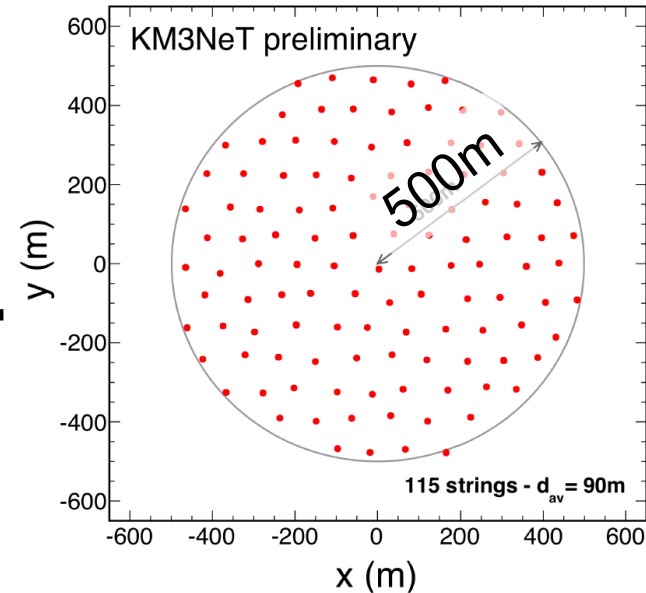


ARCA =
Astroparticle
Research with
Cosmics in the
Abyss

Vertical DOM
distance = 36 m

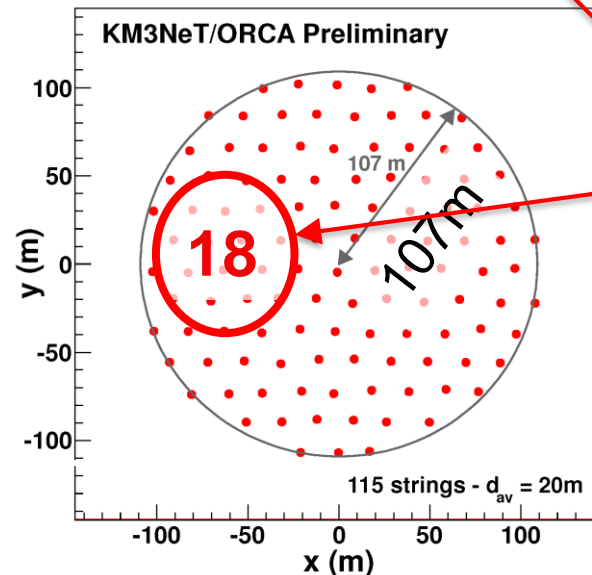


+



ORCA =
Oscillation
Research with
Cosmics in the
Abyss

Vertical DOM
distance = 9 m



Currently installed

KM3NeT 2.0 Letter of Intent:
arXiv:1601.07459 and
J.Phys. G43 (2016) 084001

Towards completion (and beyond)

- With current human & technical resources:
Completion 2028
- Funding situation:
 - Not yet fully funded, but continued construction currently secured
 - Major applications in the pipeline (France, Italy, Netherlands)
 - Smaller but non-negligible contributions by new partners (Czech Republic, Slovakia, ...)
- Expectation & design specification:
Operation for >10 years after completion

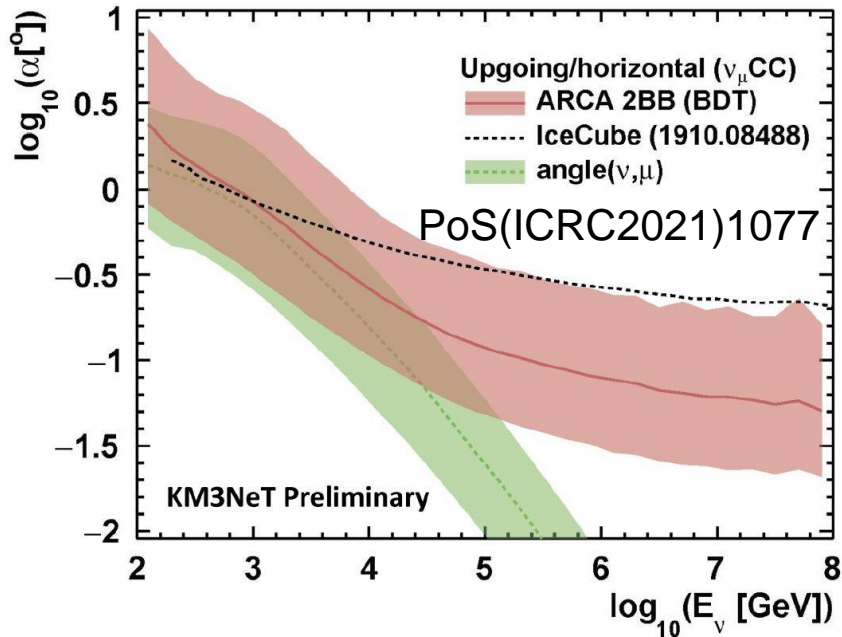


A few highlight results

KM3NeT/ARCA: Angular resolution

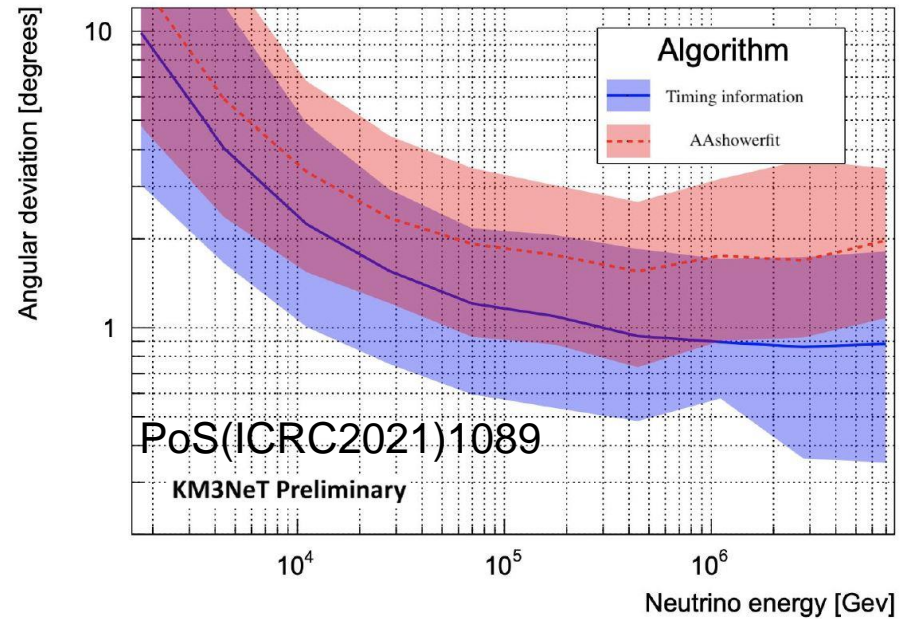


Track-like events



Better than 0.1° for $E > 100$ TeV

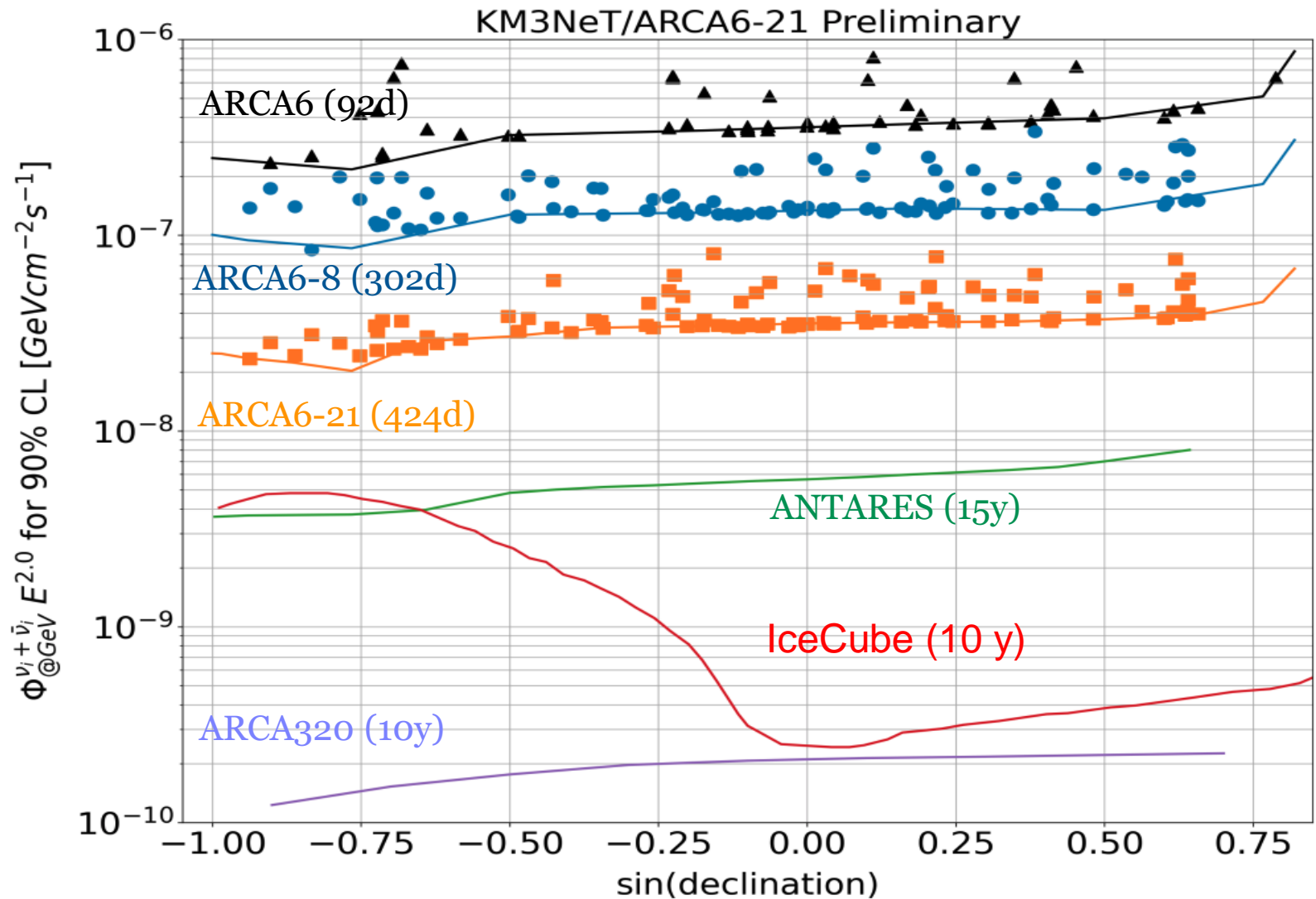
Shower-like events



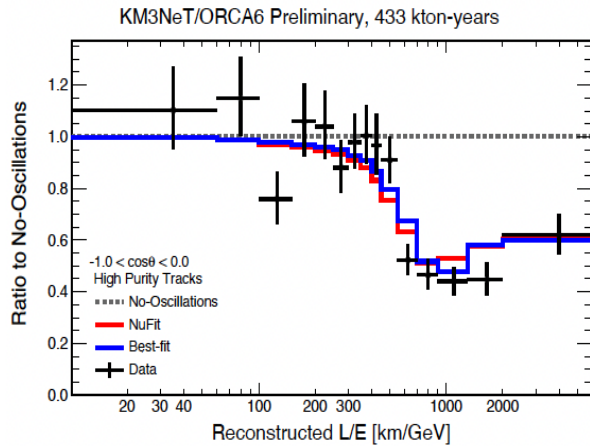
Better than 1° for $E > 30$ TeV

Data confirm/exceed expectations!

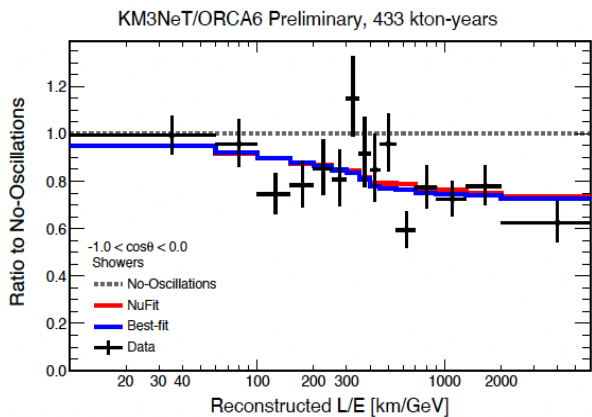
Astronomy: Point source searches



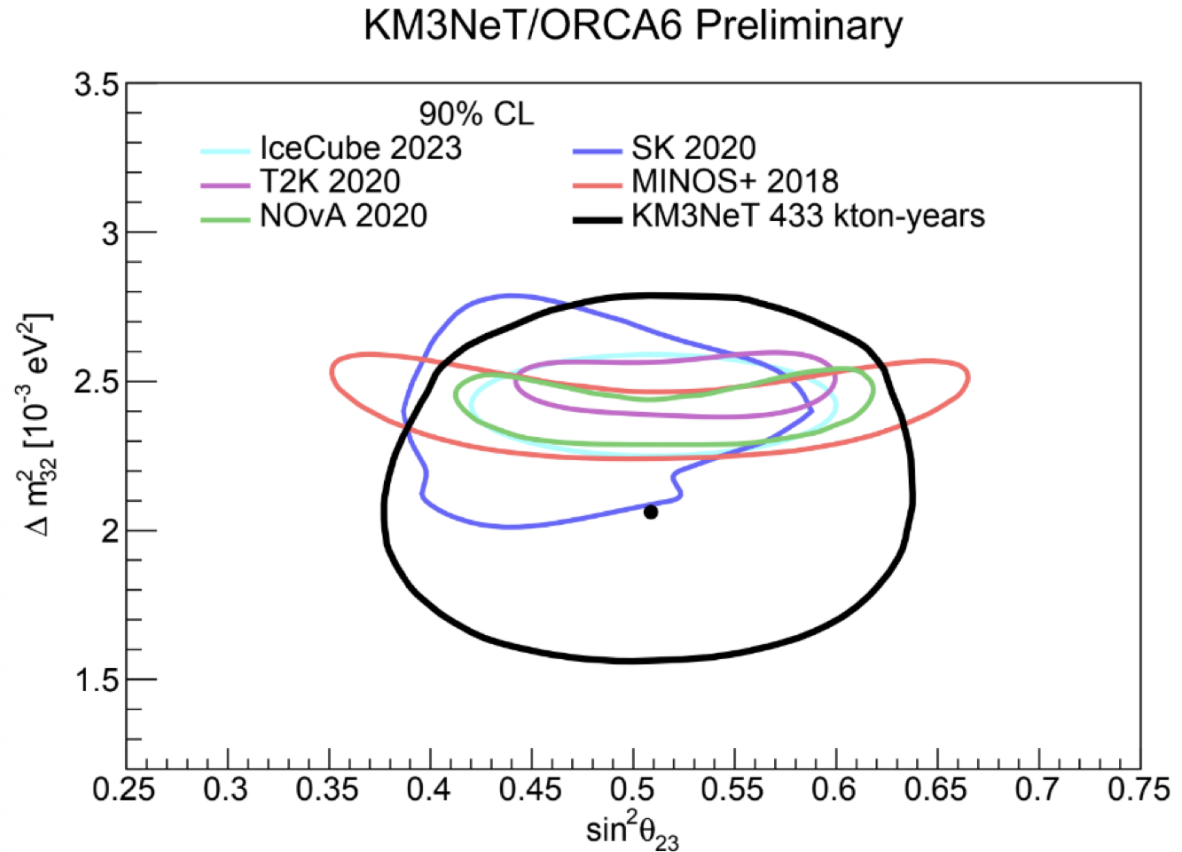
Neutrino oscillations @ ICRC2023



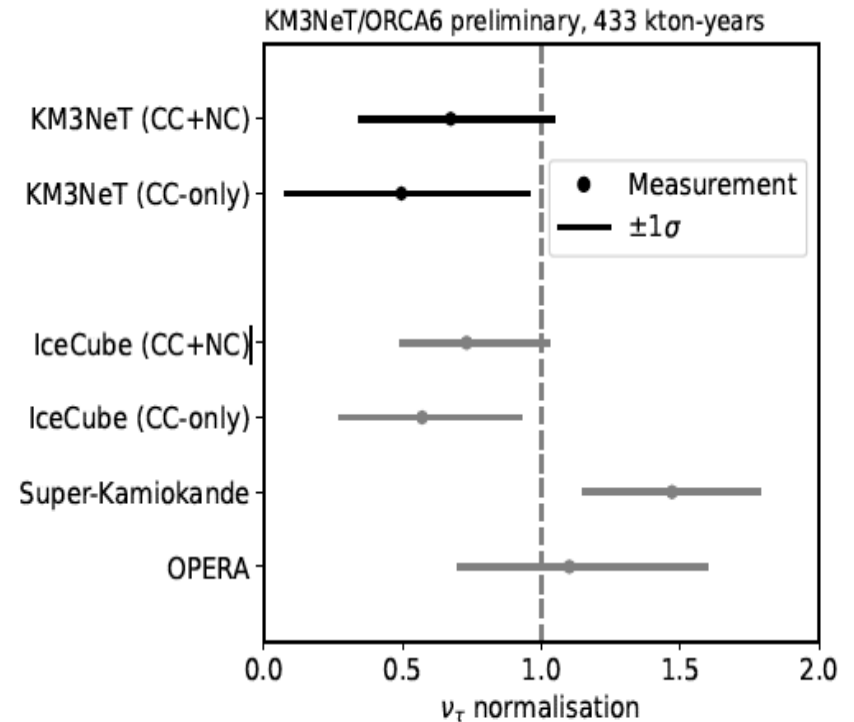
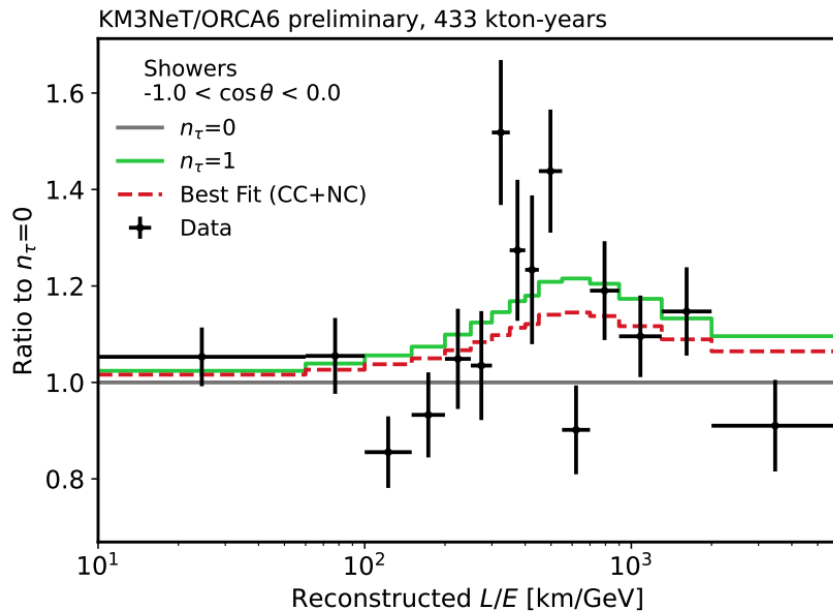
High Purity Tracks



Showers



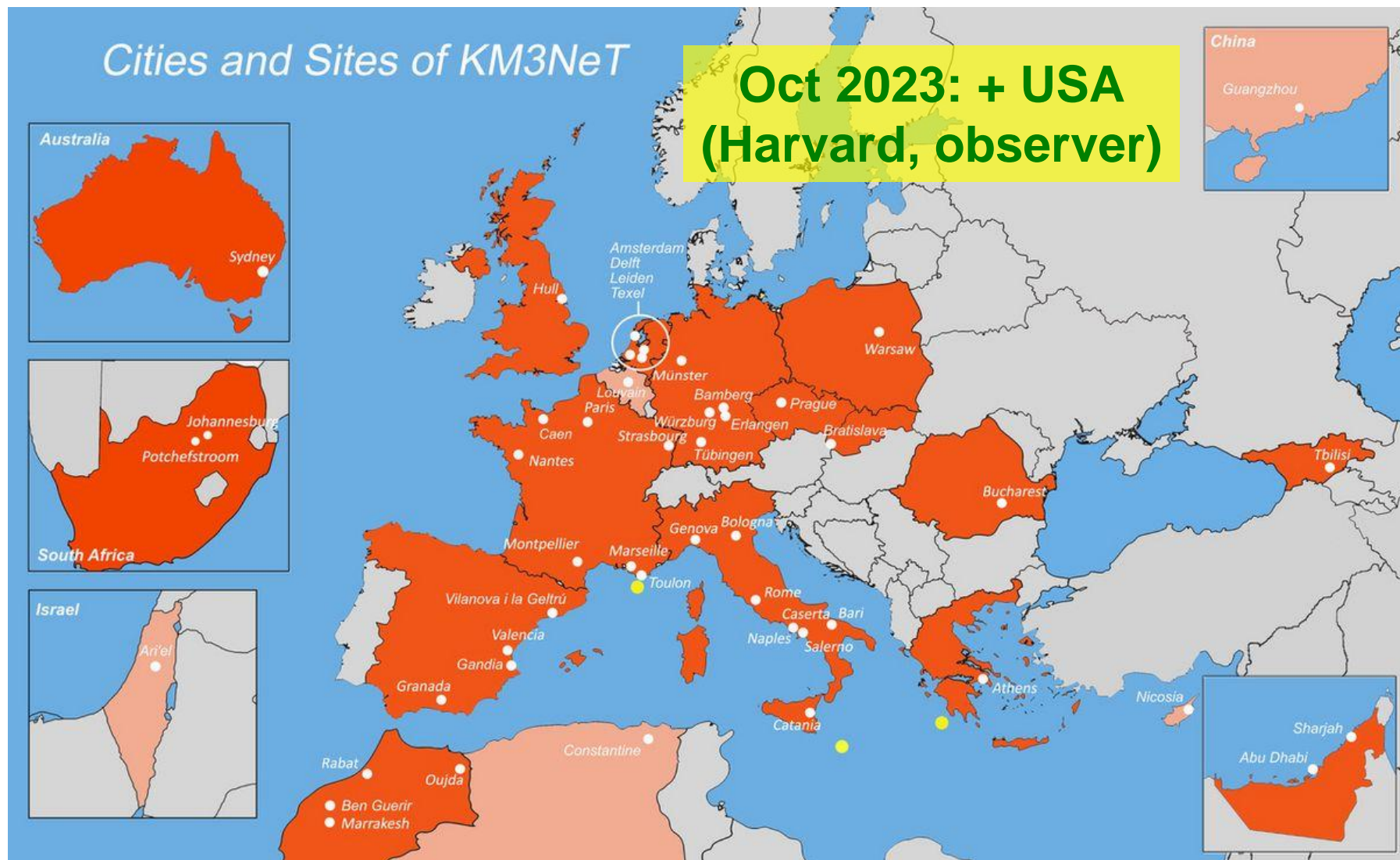
Neutrino tau appearance @ ICRC2023 (2)





Collaboration status & plans in Germany

KM3NeT Collaboration map (April 2023)





- Erlangen:
 - UK retires April 2025
 - CK takes over
 - We are starting to explore funding options
- Würzburg will re-inforce full membership
- + more?
- Active observer: Münster