

Neutrino group@Nikhef



Dorothea Samtleben on behalf of the Neutrino Group

Ambitions

- Neutrino properties through oscillations
- Cosmic neutrino sources
- Dark matter
- Fundamental physics, BSM (beyond-the standard model)

Experiments:

KM3NeT:

km³ neutrino telescope in the Mediterranean Sea

KM3NeT-ARCA -> Cosmic neutrinos

KM3NeT-ORCA -> Neutrino oscillations

further: cosmic rays, dark matter

Talk Clara Gaius &
Thijs van Eeden

DUNE:

Sanford Underground Research Facility,
South Dakota, USA

Neutrino beam from **Fermilab** (1300km)

-> Neutrino oscillations, CP-phase

Talk Vikas Gupta

KM3NeT - A neutrino detector to find them all:

- neutrino oscillations
- cosmic neutrino sources
- cosmic rays
- dark matter



Digital Optical Module (DOM) -> interactive session Tuesday

KM3NeT - A neutrino detector to find them all:

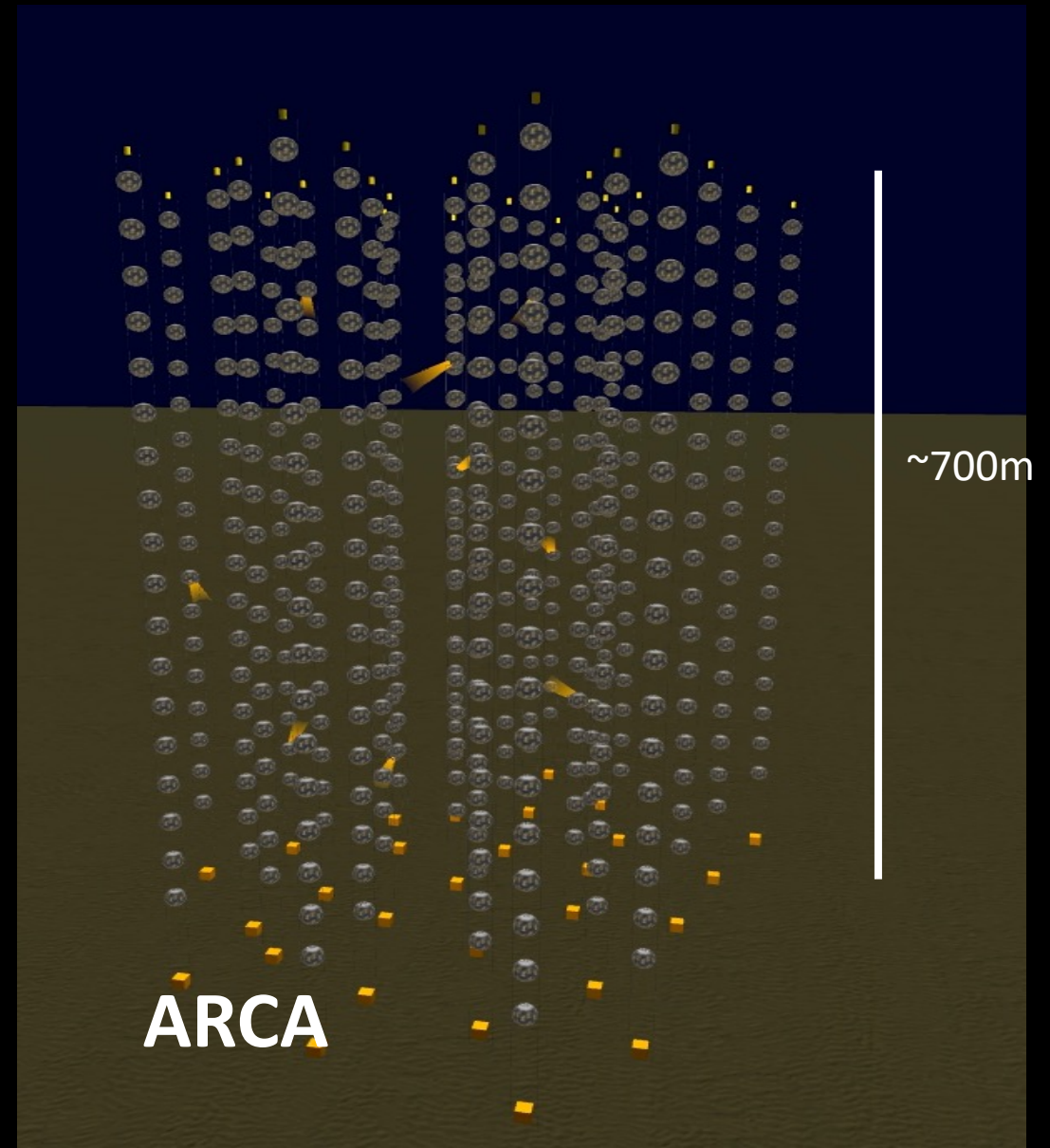
- neutrino oscillations
- cosmic neutrino sources
- cosmic rays
- dark matter

ARCA: 27 strings operating

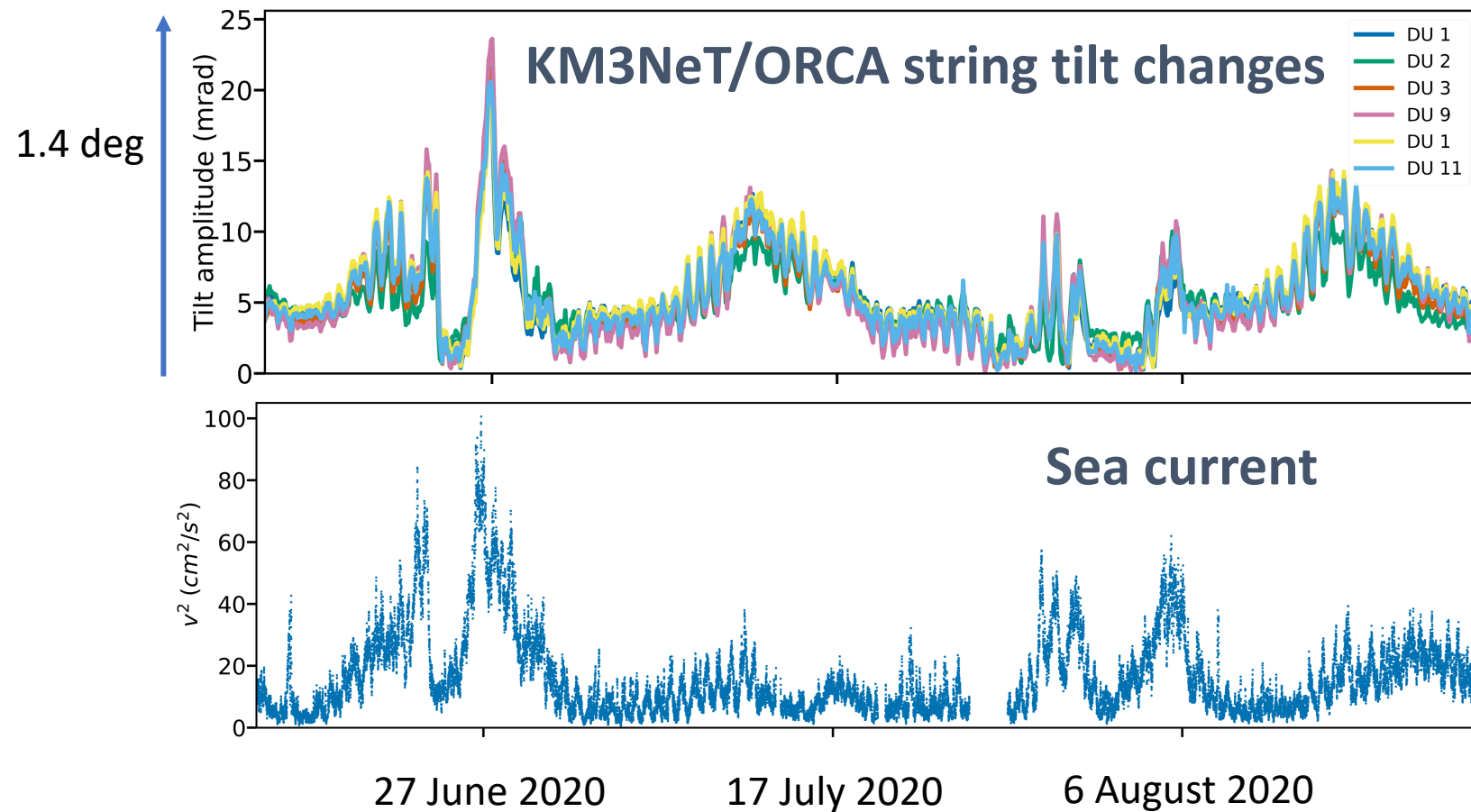
-> goal $2 \times 10^{11.5}$ by 2029

ORCA: 18 strings operating

-> goal $10^{11.5}$ by 2029



Dynamically tracking the detector positions



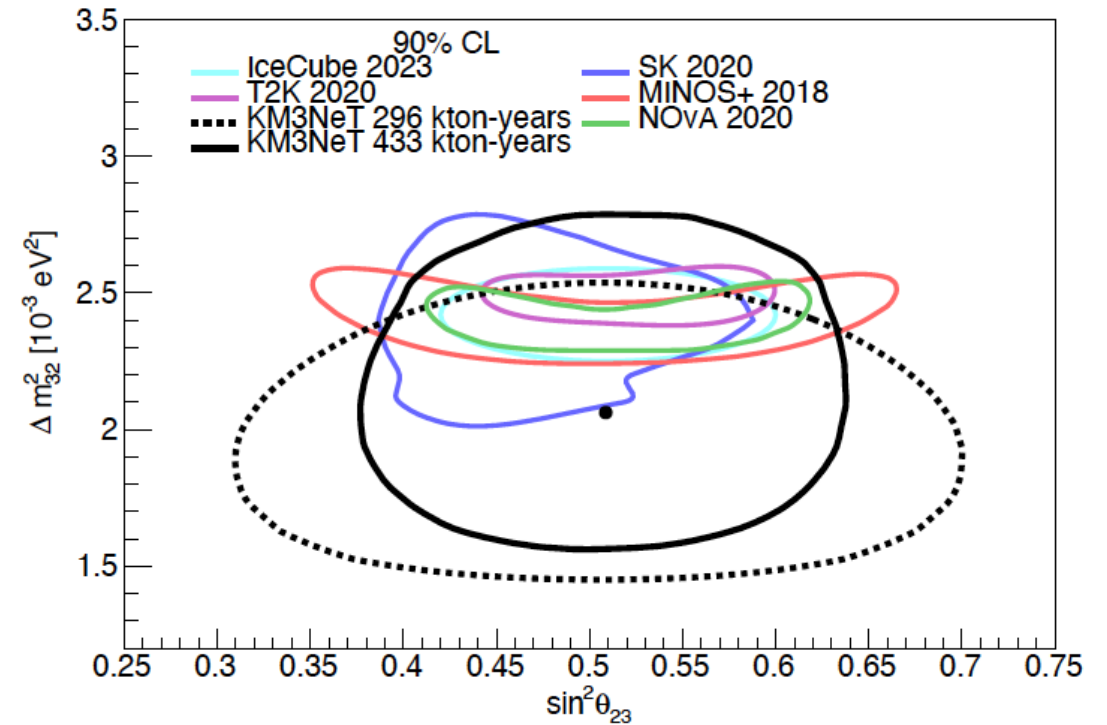
Trigger & Calibrations & Event reconstructions developed
=> Basis for science analyses

Neutrino oscillations with KM3NeT/ORCA

Already sensitive physics analyses underway

- Oscillation parameters
-> towards mass ordering measurement
- Evaluations for tau appearance, neutrino decays, non-standard interactions, sterile neutrinos

Neutrino oscillation parameter measurement KM3NeT/ORCA6 Preliminary



**Update for NEUTRINO 2024
=> Unblinding this afternoon!**



Outing at Biesbosch and visit at MCAP -> Production site of Vertical Electro Optical Cables for KM3NeT



No neutrinos found in these waters



On the look-out for neutrinos?

Joined: Vincent Kueviakoe (PhD candidate) in September 2023
Victor Carretero Cuenca (postdoc) in January 2024

Left: Brían Ó Fearraigh PhD defense 22nd February 2024
-> postdoc in KM3NeT Genua
Jhilik Majumdar (postdoc) -> KNMI May 2024

PhD defenses scheduled in October 2024 for
Thijs Juan van Eeden -> IceCube@DESY
Jordan Seneca -> KNMI



Vincent



Victor



Brían



Thijs




Jordan



Jhilik

Detector construction in the Pimu hall

 **KM3NeT**
Opens a


window on our universe

By now:

**>600 Digital Optical Modules (DOMs) produced
31 Strings (Detection Units – DUs) integrated**

Detector construction in the Pimu hall

Technical support for KM3NeT

Detector production: Jorgen Brinkman, Willem Scholte, Ivan Gromov, Oscar van Petten, Robin Schmeitz, Hans Band, Menno de Graaf, Edward Berbee, Jan-Willem Schmelling, Antonio d'Amico, Ernst-Jan Buis

Electronics: Michael Naafs, Julio Acosta

Firmware: Ton Damen, Peter Jansweijer

Support from escience: Bouwe Andela, Victor Azizi

Many thanks for making KM3NeT happen!

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