

THURSDAY JUNE 16, 2022

# CAN MEETING

Stan Bentvelsen

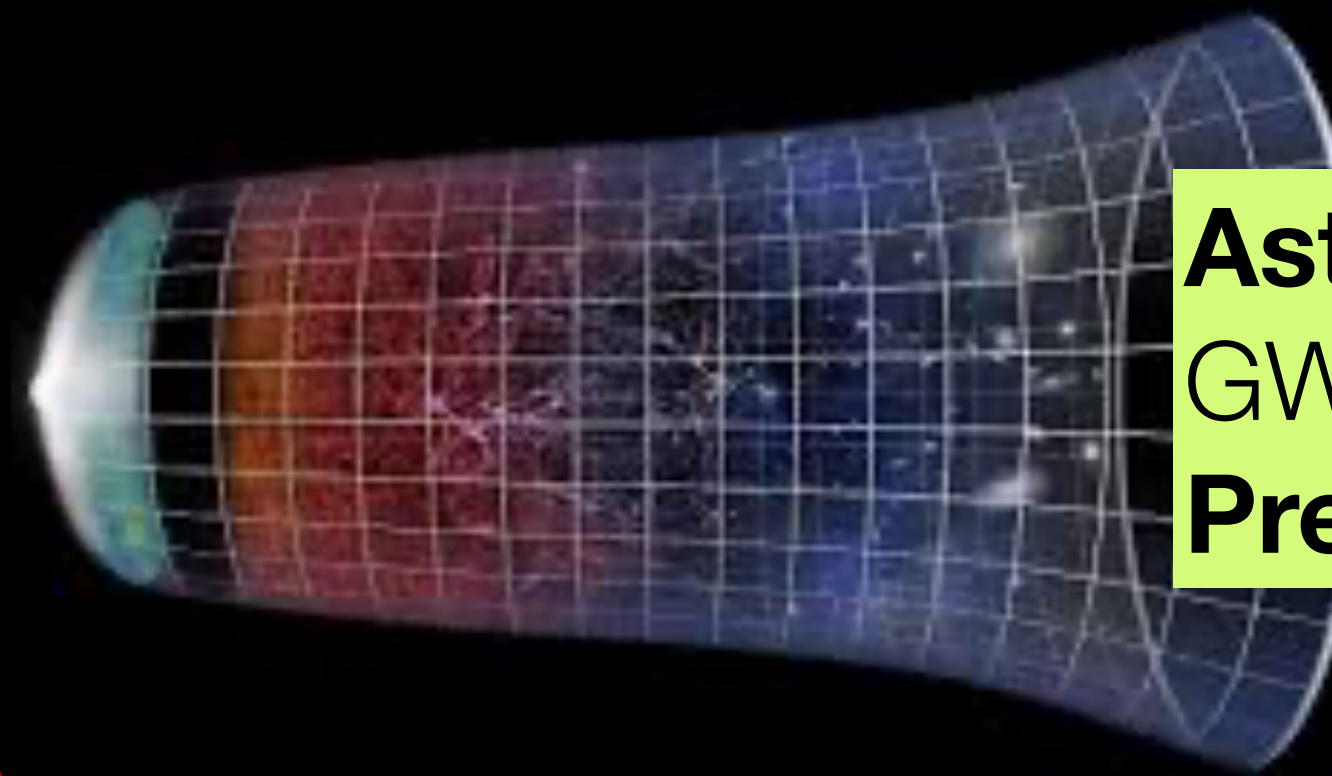
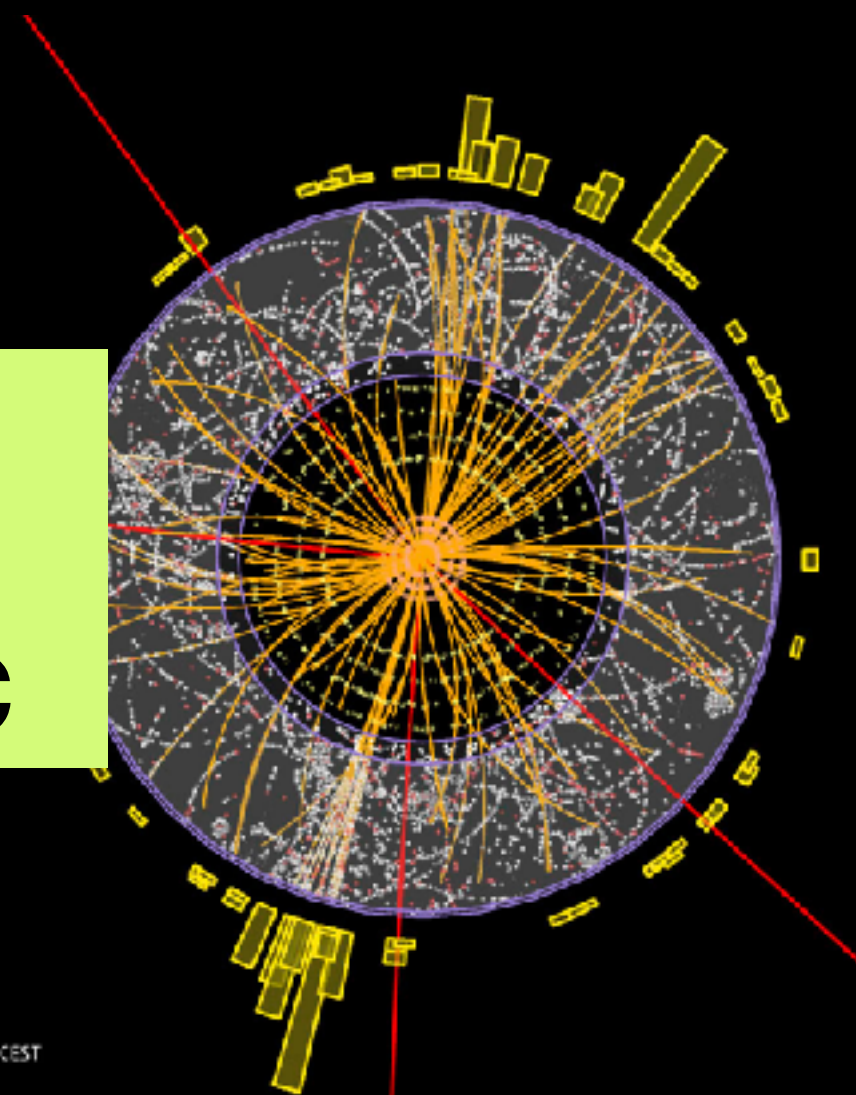
# THE MISSION OF NIKHEF

## Elementary constituents and forces of our Universe

- Accelerator based Particle Physics - at CERN
- Astroparticle physics - particles and radiation from the cosmos

**LHC operation >2030**  
ATLAS, LHCb, ALICE  
**Preparations beyond LHC**

ATLAS  
EXPERIMENT  
<https://atlas.cern>  
Run: 183280  
Event: 143576946  
2013-09-14 12:37:11 CEST



**Astroparticle physics**  
GW, DM, Neutrino, UHECR,  $eEDM$   
**Preparations next generations**

- Enabling programs
  - Detector R&D
  - Theory - phenomenology
  - Data Processing

- Technical workshops
  - Mechanical
  - Electronics
  - Computing



# NATIONAL SCIENCE PROGRAM

## Symbiosis between NWO and University partners

- University partners in key positions
  - Leaders of the scientific programs
  - >60% of our scientific staff from universities
- Added value Nikhef institute infrastructure
  - Technical competence and support
  - Large computing infrastructure
  - Long term strategy & commitment

## Finance based on three pillars

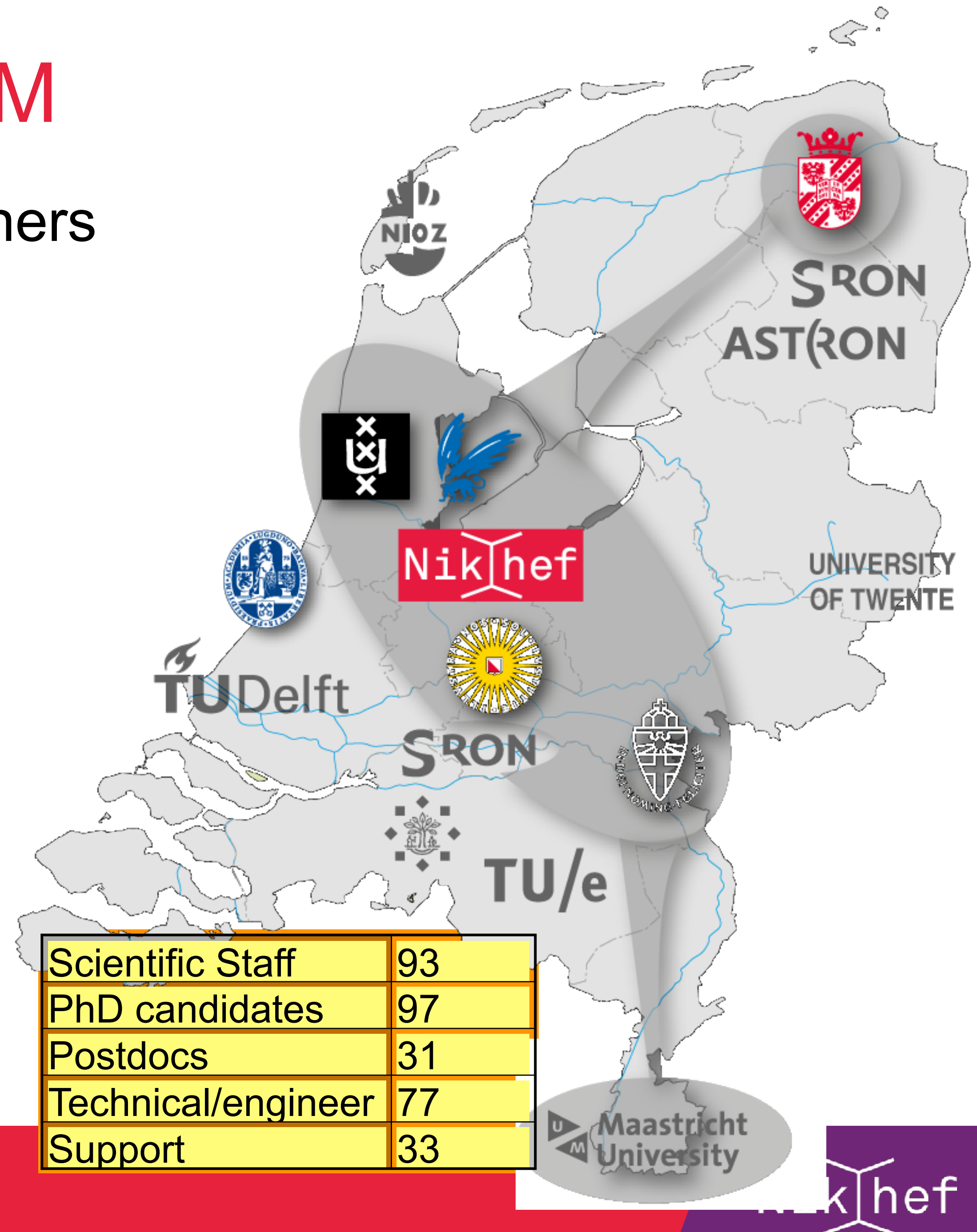
### Finance of our Nikhef National Strategy

NWO Mission  
~15 ME

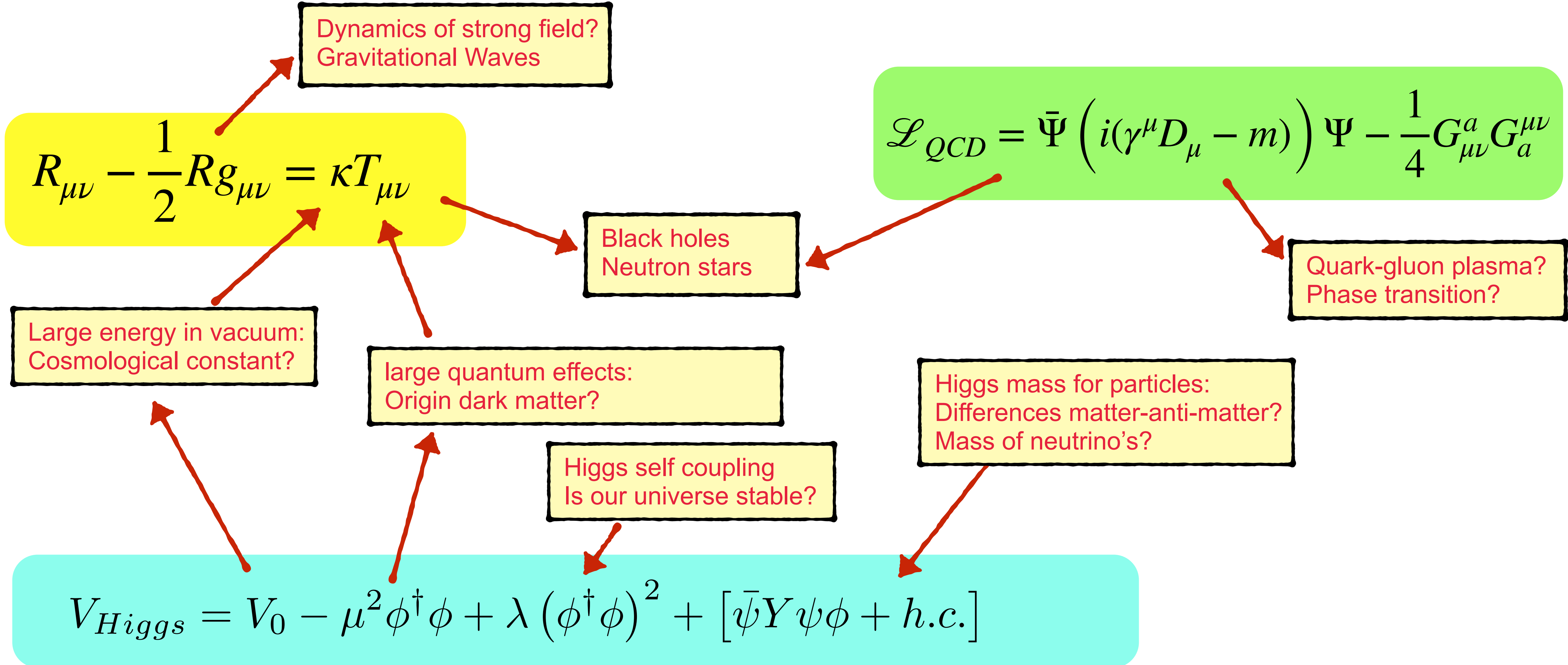
Open competition  
and data centre  
~15 ME

VSNU (in-kind)  
~15 ME

Scientific Staff	93
PhD candidates	97
Postdocs	31
Technical/engineer	77
Support	33

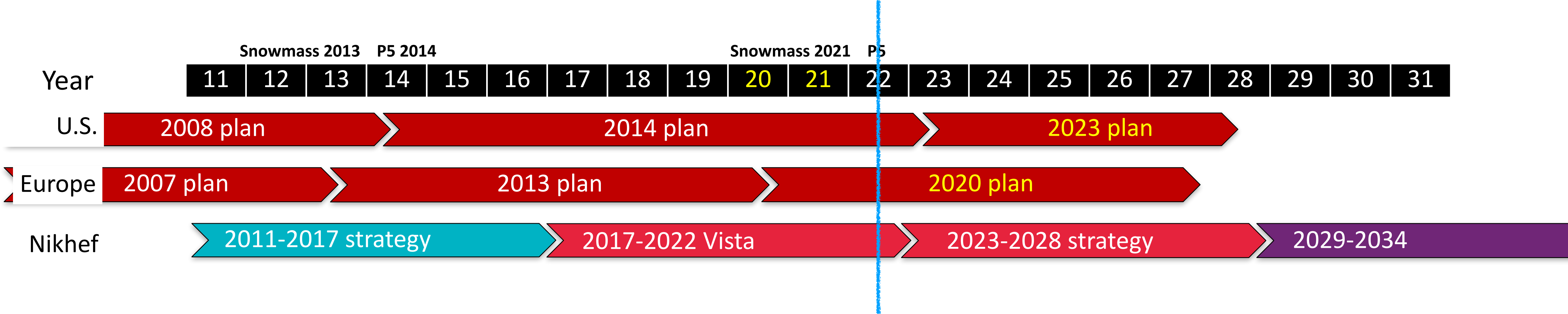


# WE LIVE IN A MOST FASCINATING TIME!



# NIKHEF STRATEGY CYCLE

## Vista: Strategy of Nikhef: 2017-2022



- Our next strategy period: 2023-2028

## *Nikhef staff meeting to discuss our strategy: September 2022*

- Input from CAN is most welcome



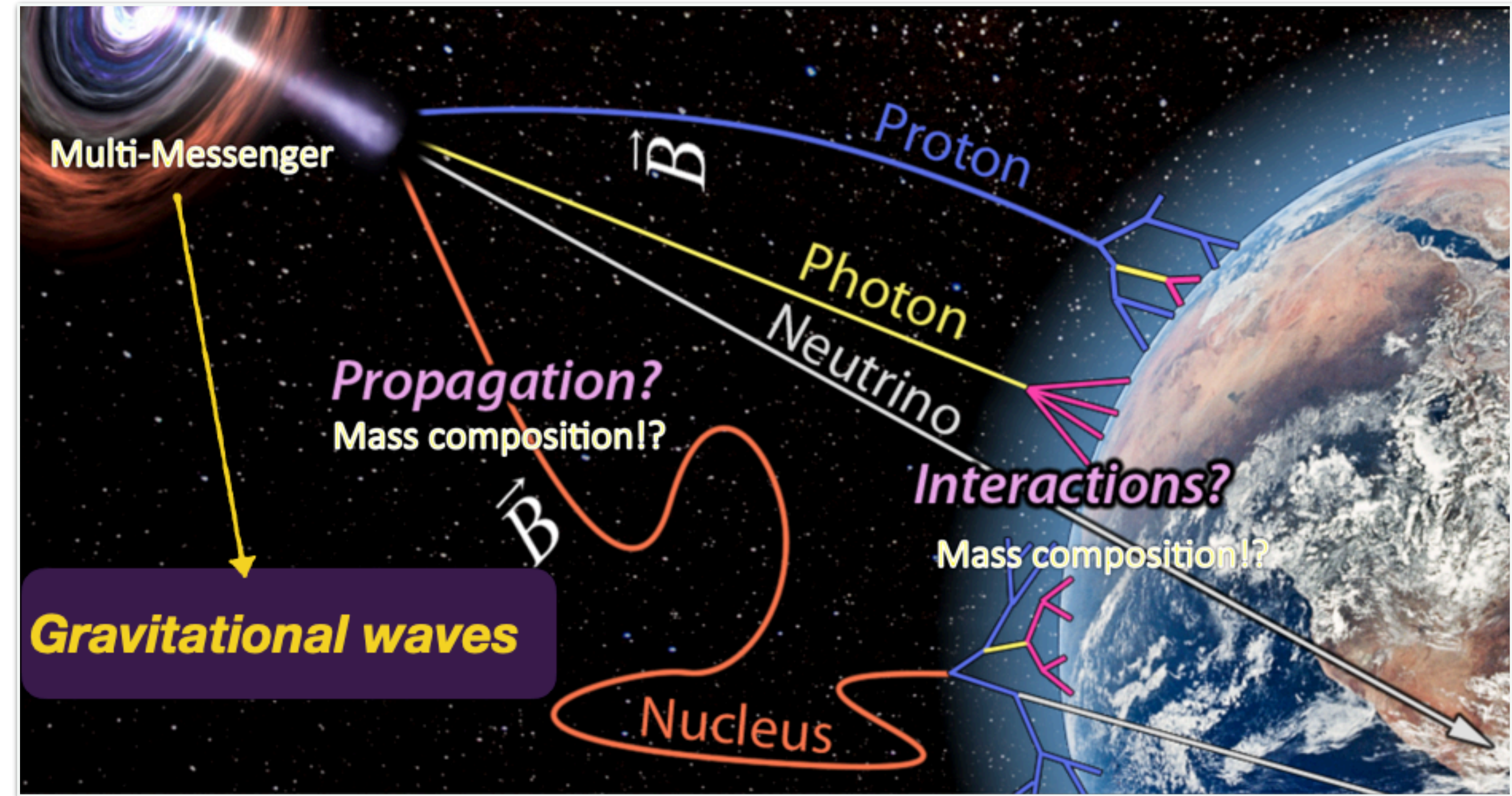
# ASTROPARTICLE PHYSICS

APP activities at Nikhef: increasingly important

- CAN advises the APP Strategic Committee (AppSC)
  - AppSC: director Nikhef, chair of the RvdA (astronomy) and support from NWO
  - CAN: Advisory board for AppSC
    - *We look forward to your observations and advices!*

## Portfolio Nikhef APP

- Well balanced
- All particles/fields except (hard) photons





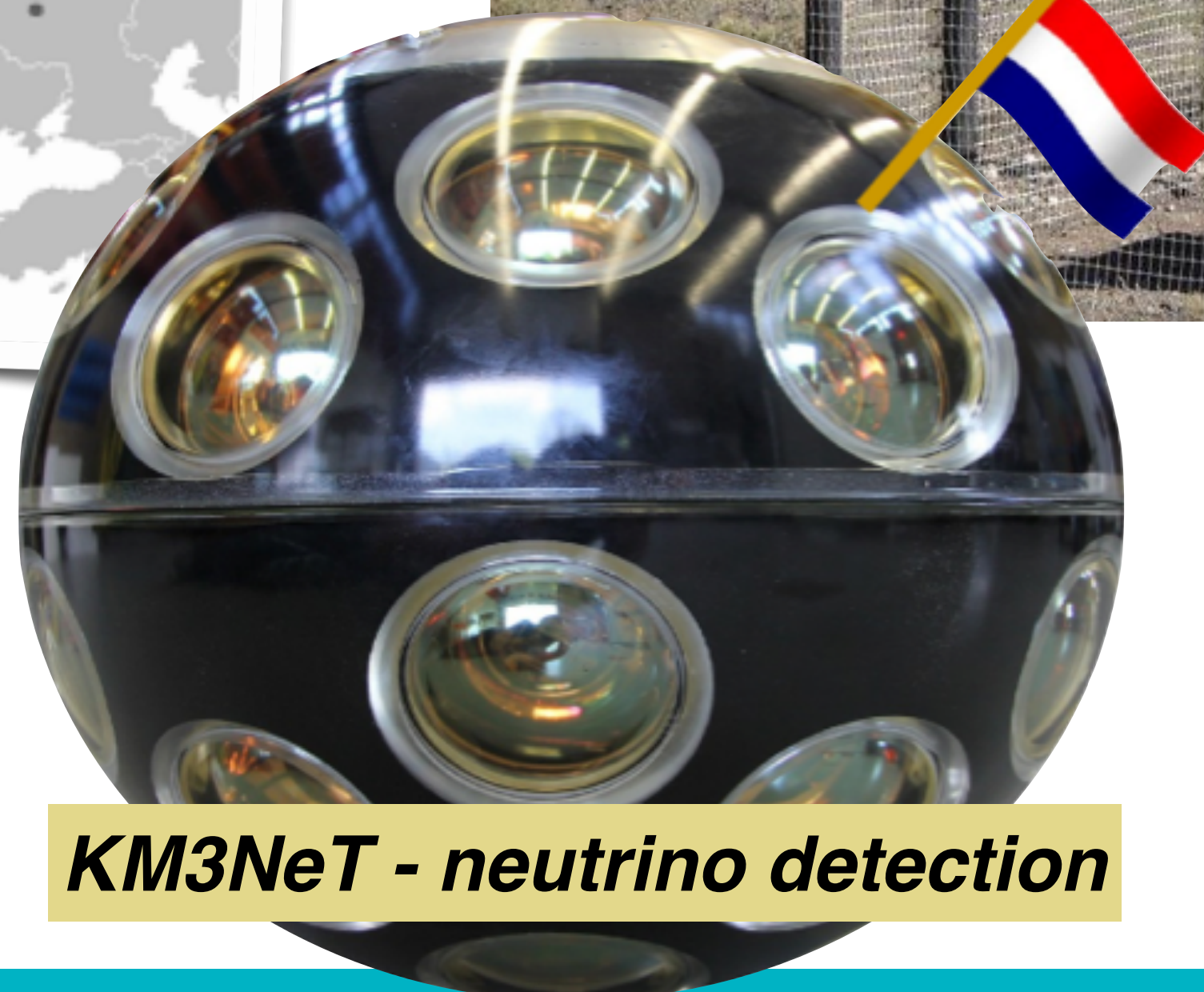
# ASTROPARTICLE PORTFOLIO @ NIKHEF



**Pierre Auger - cosmic rays**



**Xenon1T - Dark Matter**



**KM3NeT - neutrino detection**



**Adv VIRGO - Gravitational Waves**





# STRATEGY 2017 - 2022

## 1. *Proven approaches*

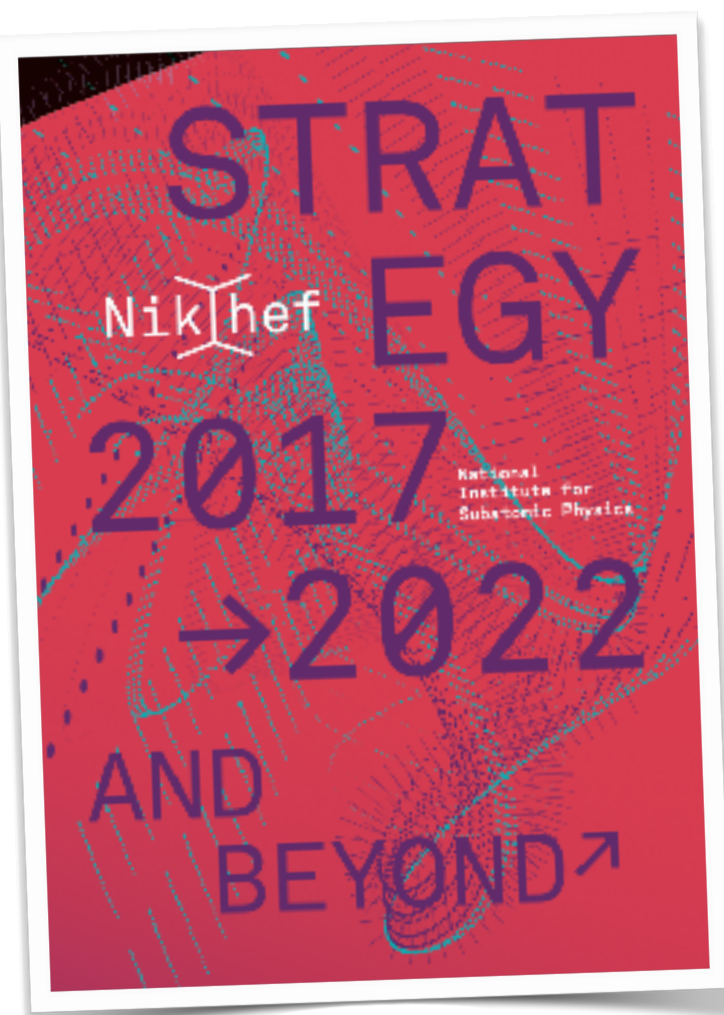
- Construct the upgrades and exploit the physics of the LHC experiments ATLAS, LHCb and ALICE
- Build KM3NeT phase 2.0 and exploit neutrino (astro)physics
- Exploit the astroparticle experiments Advanced Virgo, XENON1T/NT and the Auger Observatory
- Full utilisation of the theory, detector R&D and computing activities

## What did Nikhef achieve?

- 😊 LHC upgrades in full swing (roadmap funding)
- 😊 KM3NeT2.0 beautiful results - ORCA/ARCA funding (roadmap)
- 😊 Gravitational Waves at Virgo a success, upgrades ongoing (NWO-G)
- 😊 AugerPrime with SSD and radio in preparation (NWO-G)
- 😊 Computing guaranteed for next period (roadmap funding - FuSE)



# STRATEGY 2017 - 2022

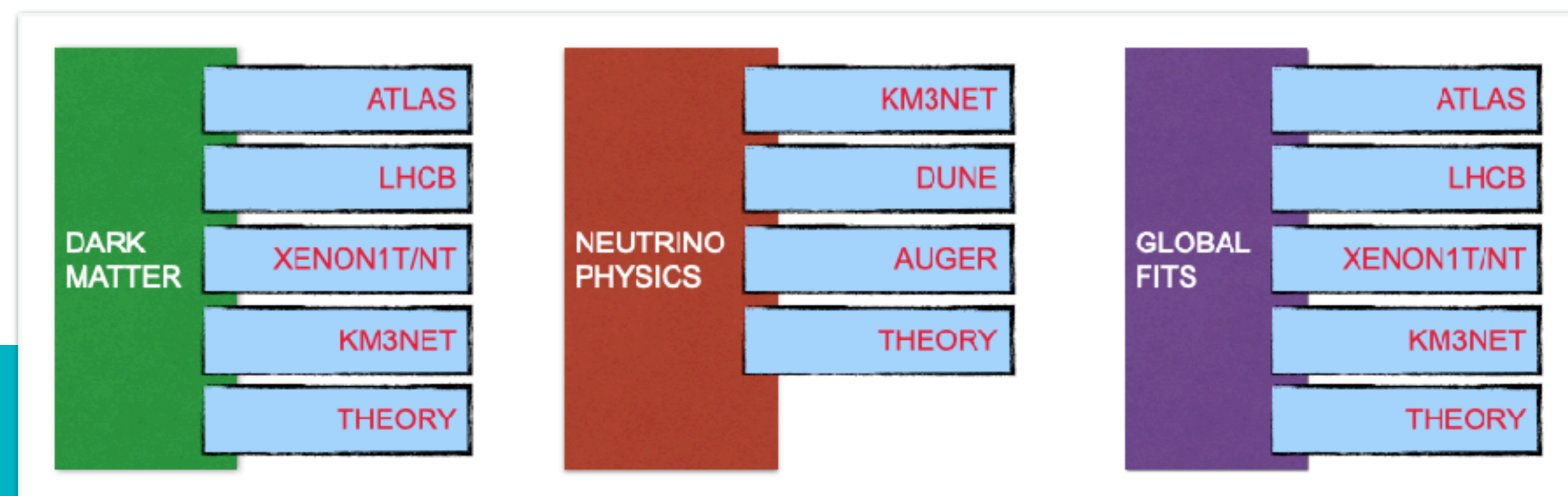


## 2. *New opportunities:*

- Determine the electron EDM with world-class precision
- Prepare for a post-LHC high-energy accelerator period
- Strengthen and exploit the thematic connections between individual scientific programmes
- Prepare a bid to locate the Einstein Telescope in the Netherlands

## What did we achieve?

- 😊 eEDM is a challenging *in-house* project, and moving forward
- 🤔 post-LHC preparations need further attention - now that we have ESPPU
- 🤔 Thematic connections: few nice examples and improvement needed
  - Xenon/KM3NeT ENW proposal
  - QCD eos: GW and HI
- 😊 Preparation for ET-NL in full swing



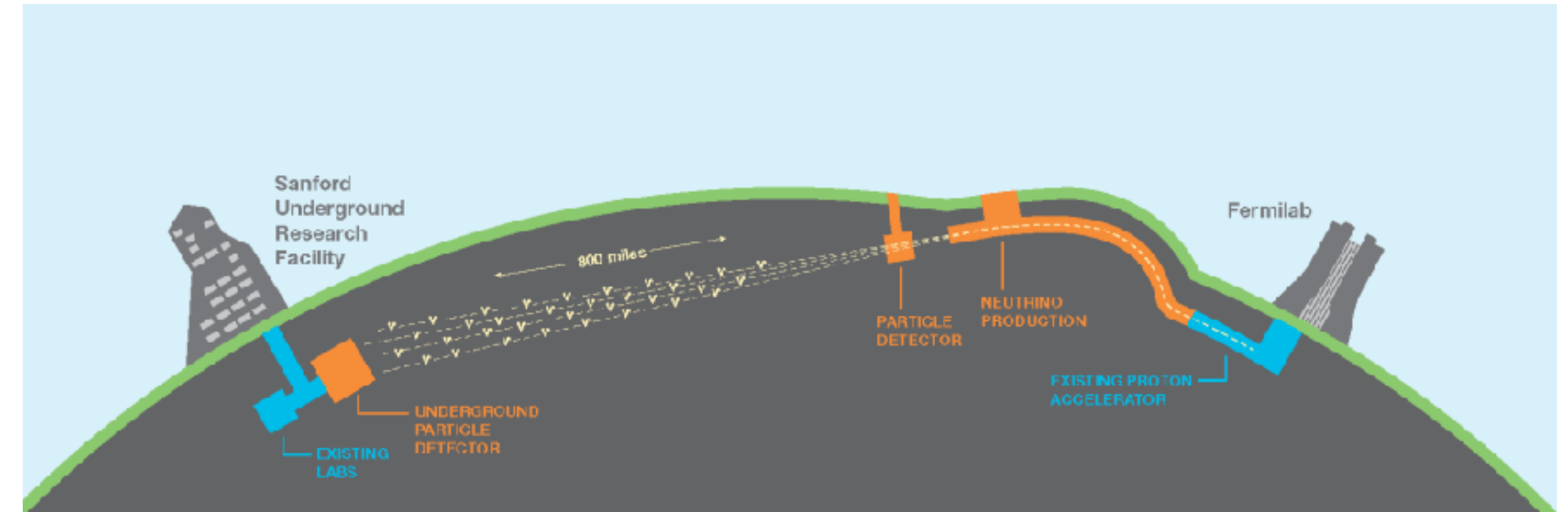


# ASTROPARTICLE PHYSICS

I expect discussions in VistaUpdate:

- Neutrino physics
  - Completion of KM3NeT2.0; involvement in DUNE
- Ultra high energetic cosmic rays
  - Radio array telescope, merge with neutrino physics?
- Direct Dark Matter
  - Plans for involvement in DARWIN/LZ
  - PTOLEMY as (relatively modest) add-on experiment in LNGS?
- Looking beyond the eEDM experiment at RUG?
- ...

And of course Gravitational Waves





# EINSTEIN TELESCOPE - ESFRI

## ESFRI proposal (2021)

- Submitted by: *Italy, Belgium, Netherlands, Poland and Spain*
- Project and collaboration also include agencies and institutions belonging to *Austria, France, Germany, Hungary, Switzerland and UK*

## Coordination

- Consortium (currently) coordinated by INFN and Nikhef

## Funds

- Preparatory funds available in some countries (IT, NL, ...)
- EU INFRA-DEV proposal approved with a grant of 3.45 M€
- EU INFRA-TECH proposal just submitted

## Site candidates

- Studies ongoing in Sardinia in Italy, B-G-NL border region, and Saxony





# ET IN EUREGIO MEUSE-RHINE (EMR)

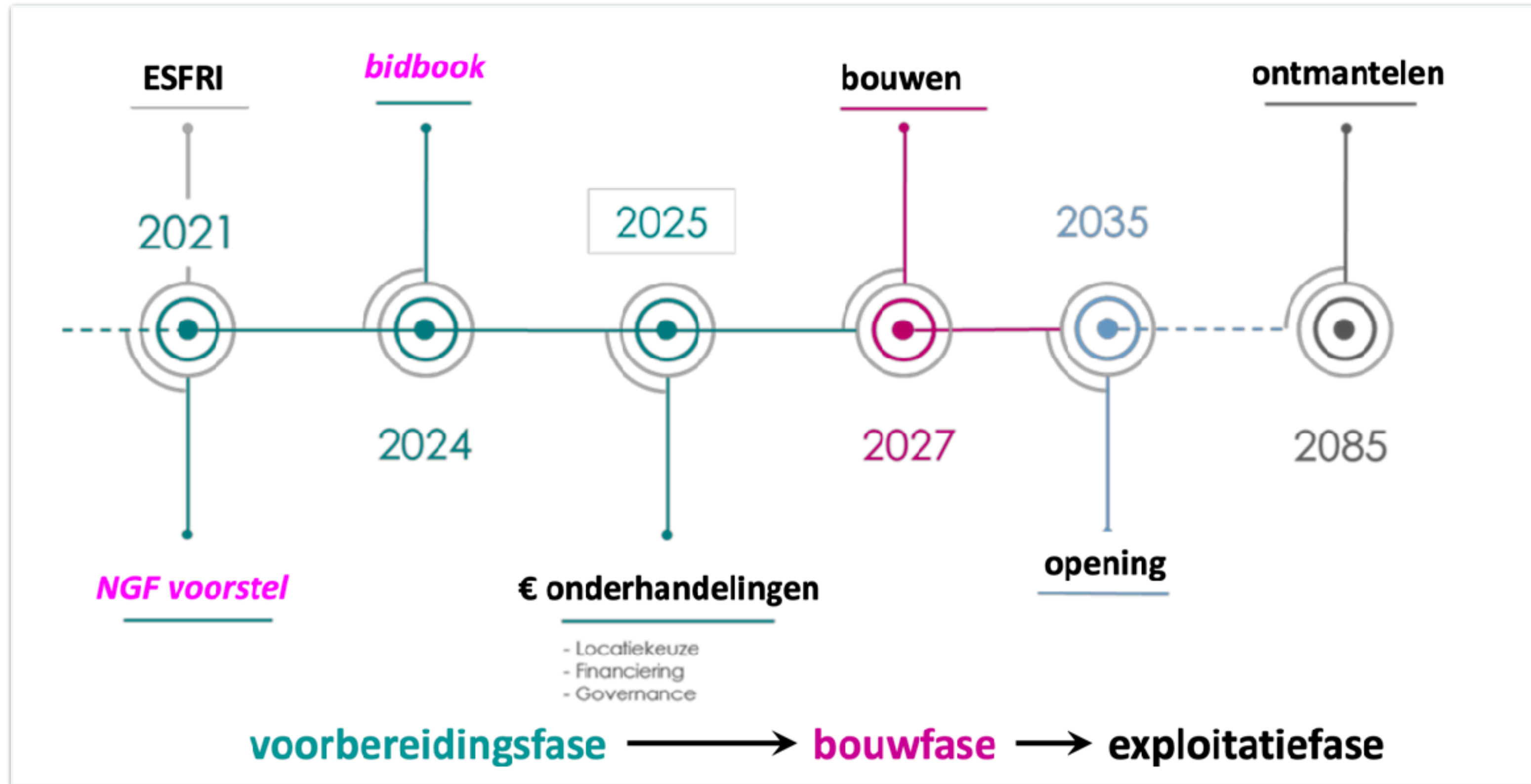
## Dutch National Growth Fund for ET

- **42 ME** (conditionally) awarded now
  - Money flows from 2023
- **19 ME:** connections to industry for research and innovation: 'the aim of this programme is to optimally position [...] in particular Dutch industry, for R&D and orders related to Einstein Telescope'
- **23 ME:** 'for the preparation toward the realisation of the underground infrastructure [...]', project organisation and management
- **870 ME** have been reserved for the construction of the ET infrastructure
  - If the EMR site is selected as the location for ET





# PLANNING FOR ET



Further close collaboration with B/G

- Investigation geology
- Surrounding management
- Communication
- ETpathfinder!

A lot of dynamics!

- OCW, EZK, Limburg Province, LIOF, Nikhef



# ETIC – ET INFRASTRUCTURE CONSORTIUM

Next Generation EU investment proposed of 100 M€ focused on ET enabling technology and Sardinian site candidature support

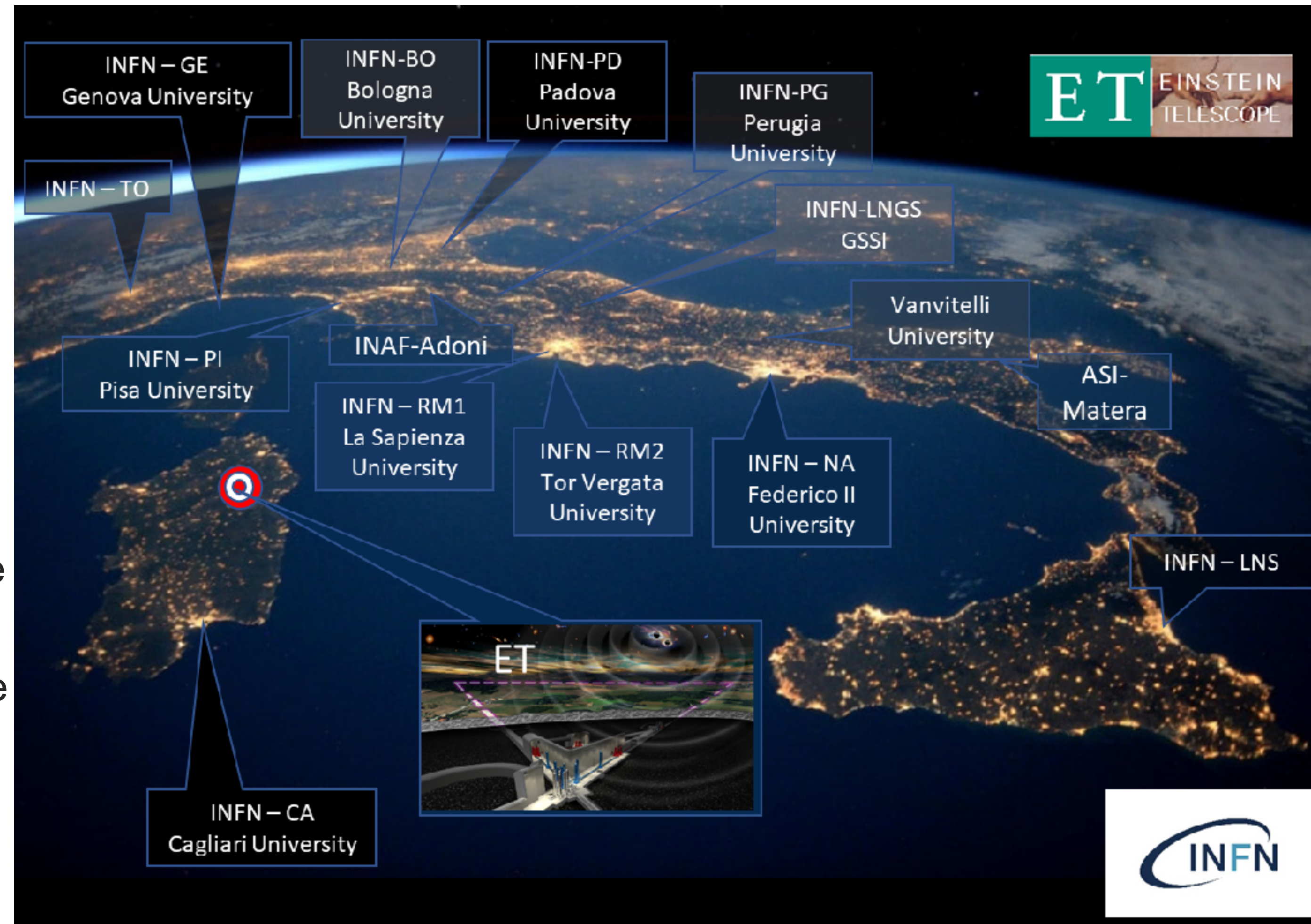
## Support for

- 8% Human resources
- 30% Scientific apparatuses
- 12% Distributed infrastructures
- 28% ET design
- 12% Training

Additional 5 M€ funding on the same framework for the site characterization

Feedback expected in June 2022

Discussion ongoing on an Italian share toward ET realization





# NATIONAL ROADMAP FOR INFRASTRUCTURE (GWI)

2021

- (SRON) LISA GW - with involvement of Nikhef in instrumentation (QPD)

2023

- Dark matter, neutrino's, ...
- LHC upgrades

2025

- Einstein Telescope ?

2027

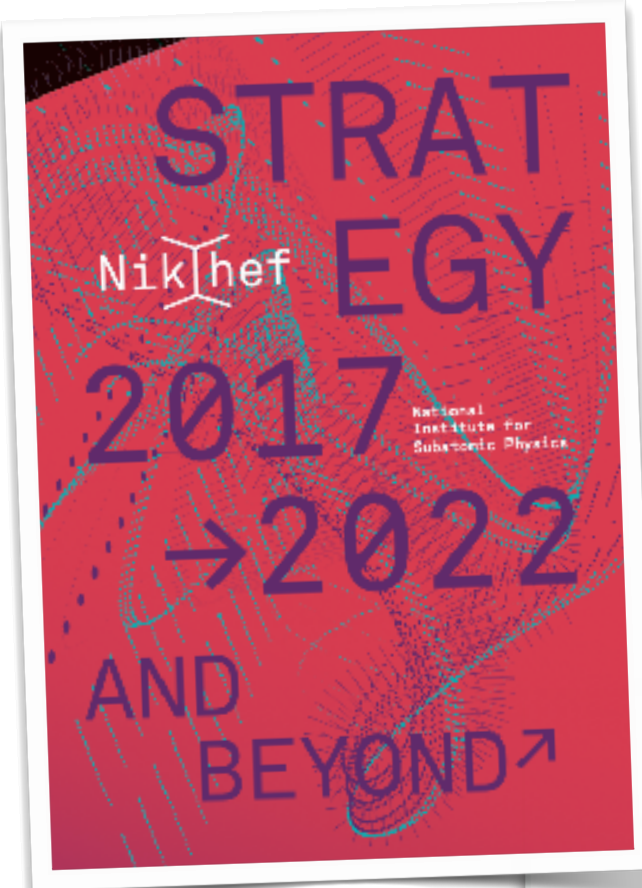
- UHECR ?







# STRATEGY 2017-2022



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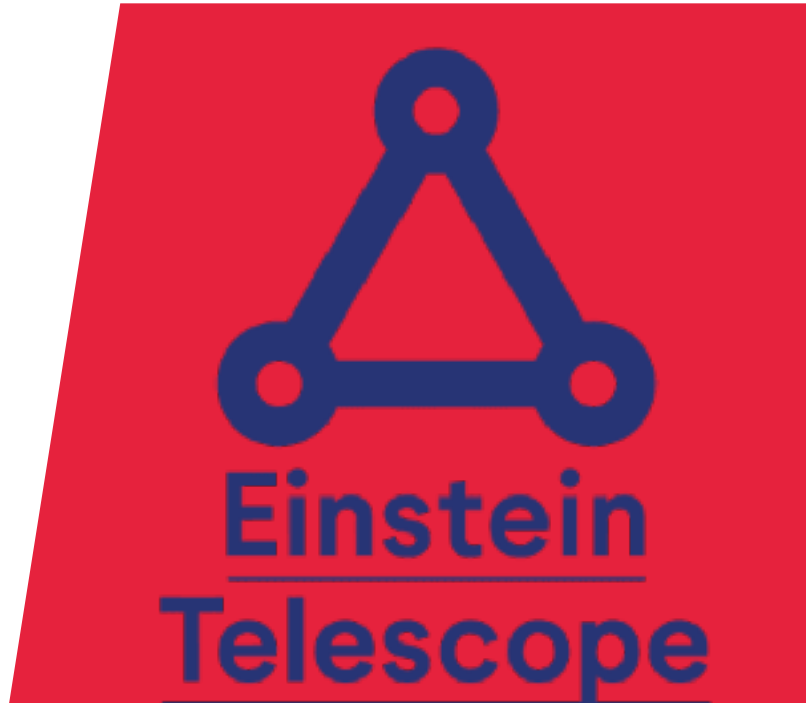
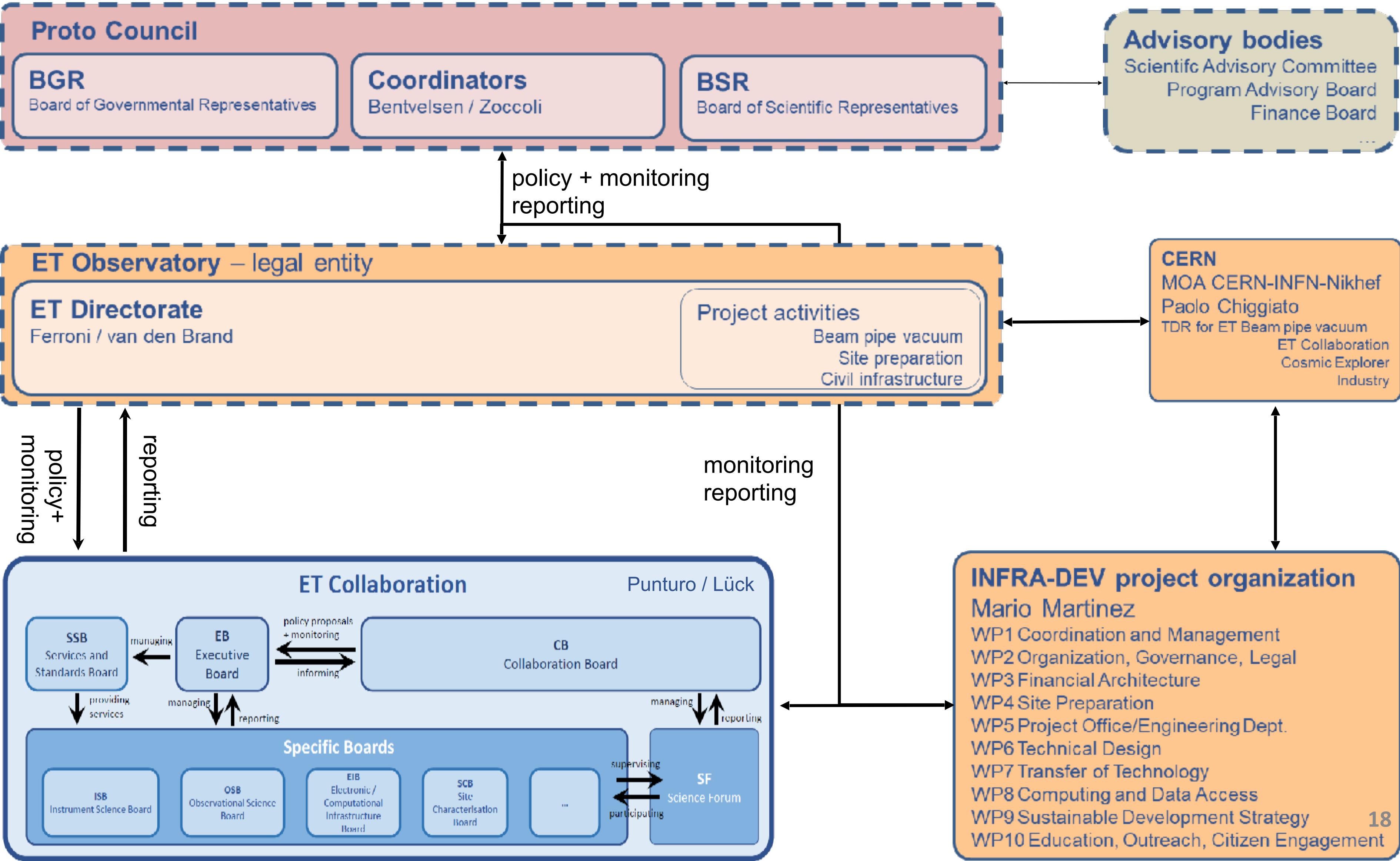
## 3. *Beyond scientific' goals:*

- Establish further links with industry in terms of transfer of knowledge generated at Nikhef
- Attract and train a new generation of scientists and engineers
- Modernise the Nikhef branding and building
- Inspire and nurture scientifically aware general audiences



# GOVERNANCE - IN EVOLUTION

Solid boxes: instantiated  
Dashed boxes: work in progress





# Particle and Astroparticle physics

*What is matter, energy, space and time?*

*What are the constituents of our universe and how do they interact?*

Nikhef

