

WEDNESDAY OCTOBER 21, 2020

# VISTA UPDATE INTRODUCTION

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# VISTA UPDATE STRATEGY MEETING

## Evaluation of the Nikhef science portfolio - a continuous process

- Main *science-drivers* for VistaUpdate:
  - Mid-term evaluation of the Nikhef strategy 2017-2022
  - Nikhef and the ESPPU and APPEC roadmap
  - Einstein Telescope in the portfolio of Nikhef

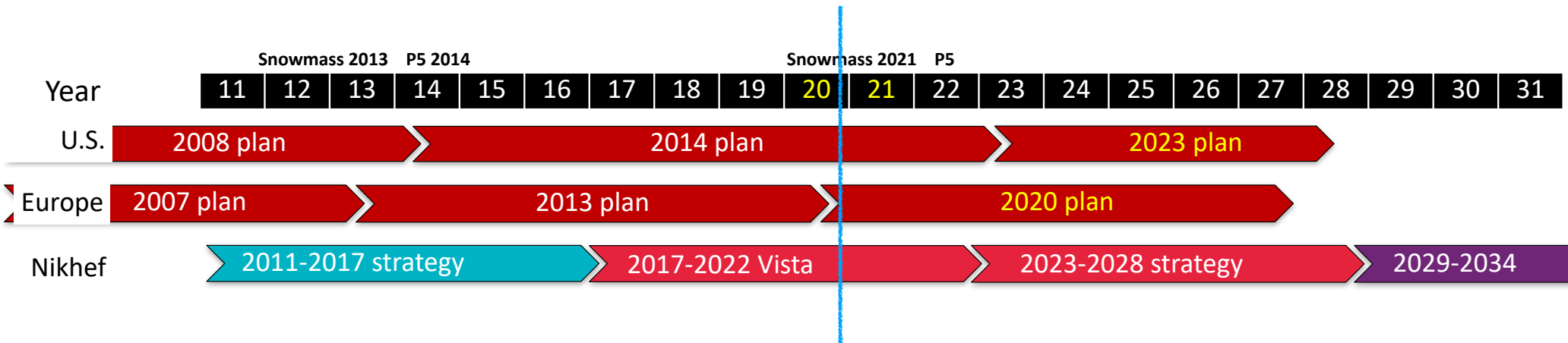
## Stripped version of the scientific discussion

- COVID-19 prevents live discussions
  - Postpone our hotel Zuiderduin meeting
- We are forced to only virtual presentations
  - Constructive discussions in zoom are very hard!



# NIKHEF STRATEGY CYCLE

## Vista: Strategy of Nikhef: 2017-2022



- Our next strategy period: 2023-2028
- We have ample time to discuss its content!

***The real VistaUpdate discussions are postponed to 2021***

- Post-COVID: potential decisions will ***not*** be made today

# TODAYS MEETING

## Plan the long-term future of our existing programs

- Program leaders will present their ambitions for ~2030
  - Next staff meeting on November 4th for feedback
- New initiatives: discussions delayed to post-COVID in 2021
- *Charles Timmermans* will present the outcome of the survey
  - To get a feel of how our community thinks
- *Eric Laenen* will remind us of the ESPPU
  - To prepare our position in this international context
- *Stefan Hild* will present the Einstein Telescope
  - To inform us all on its current status

Survey visits	
126	73
Total visits	Total completed

Survey: what you like to bring up?

participation of the whole Nikhef community in the decision process about new research programs

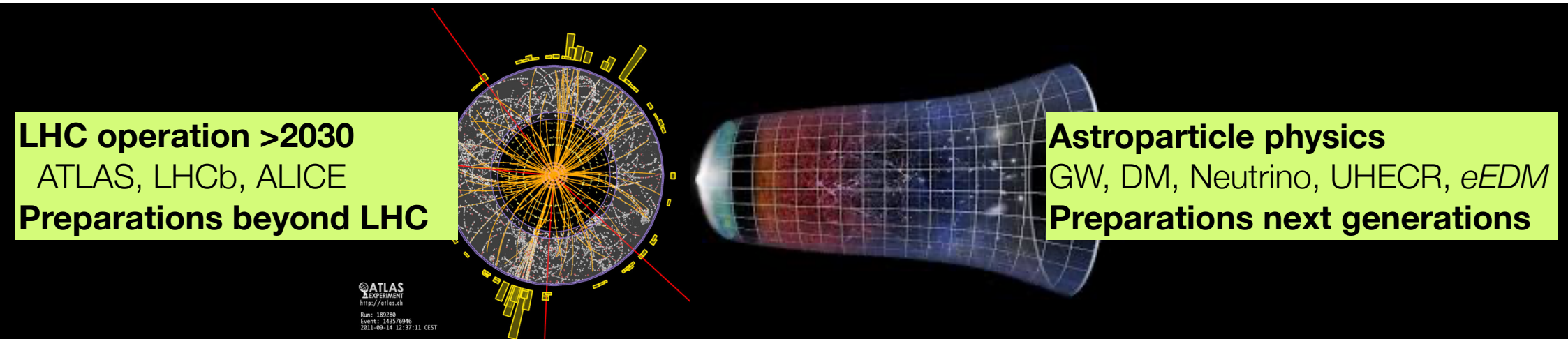
# THE MISSION OF NIKHEF

Survey: personal scientific motivation

Still curious about how the universe works

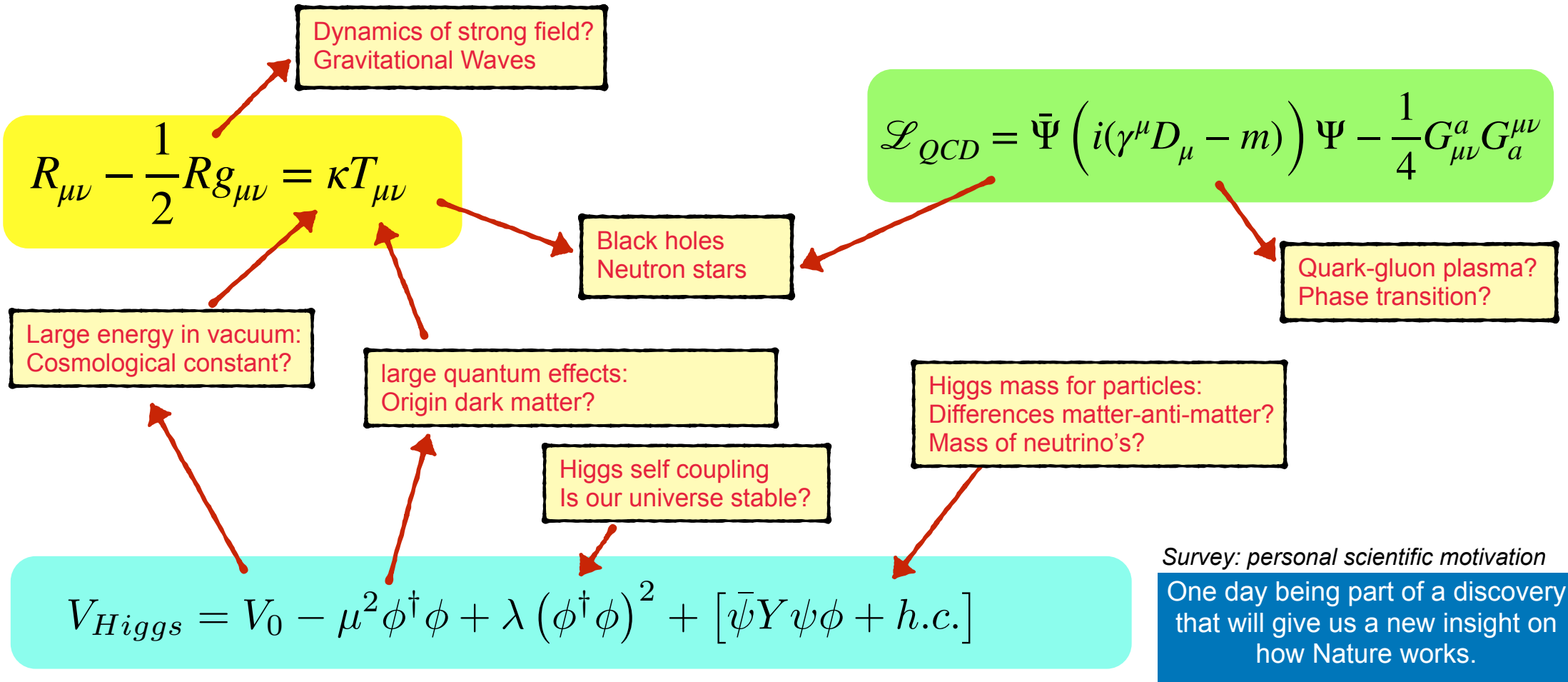
## Elementary constituents and forces of our Universe

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



- Enabling programs
  - Detector R&D
  - Theory - phenomenology
  - Data Processing
- Technical workshops
  - Mechanical
  - Electronics
  - Computing

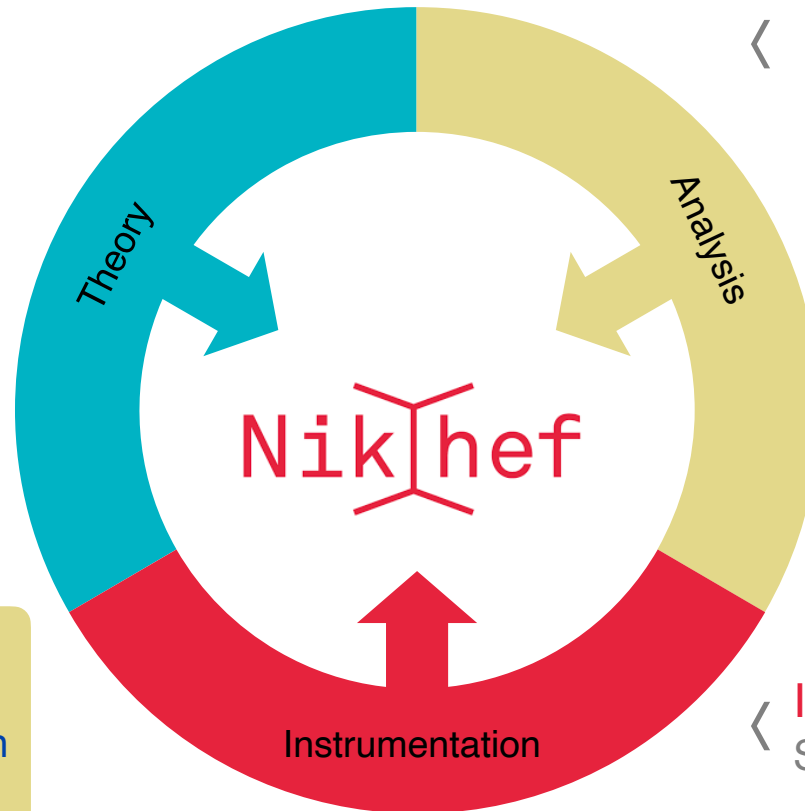
# WE LIVE IN A MOST FASCINATING TIME!



# NIKHEF HEAD, HANDS AND HEART

The strength of Nikhef is our ecosystem!

Theory phenomenology  
Accurate predictions



Data taking & Analysis  
Assemble new knowledge

Instrumentation  
State of the art detectors

Nikhef as a *top-brand*

- International powerful
- Innovative technology, spin-off and outreach
- Train and attract talent

Focus & mass in our scientific portfolio

Survey: personal scientific motivation

It is an amazing place with the right variety of research topics and an really excellent infrastructure (engineering, workshops etc).

# NATIONAL SCIENCE PROGRAM

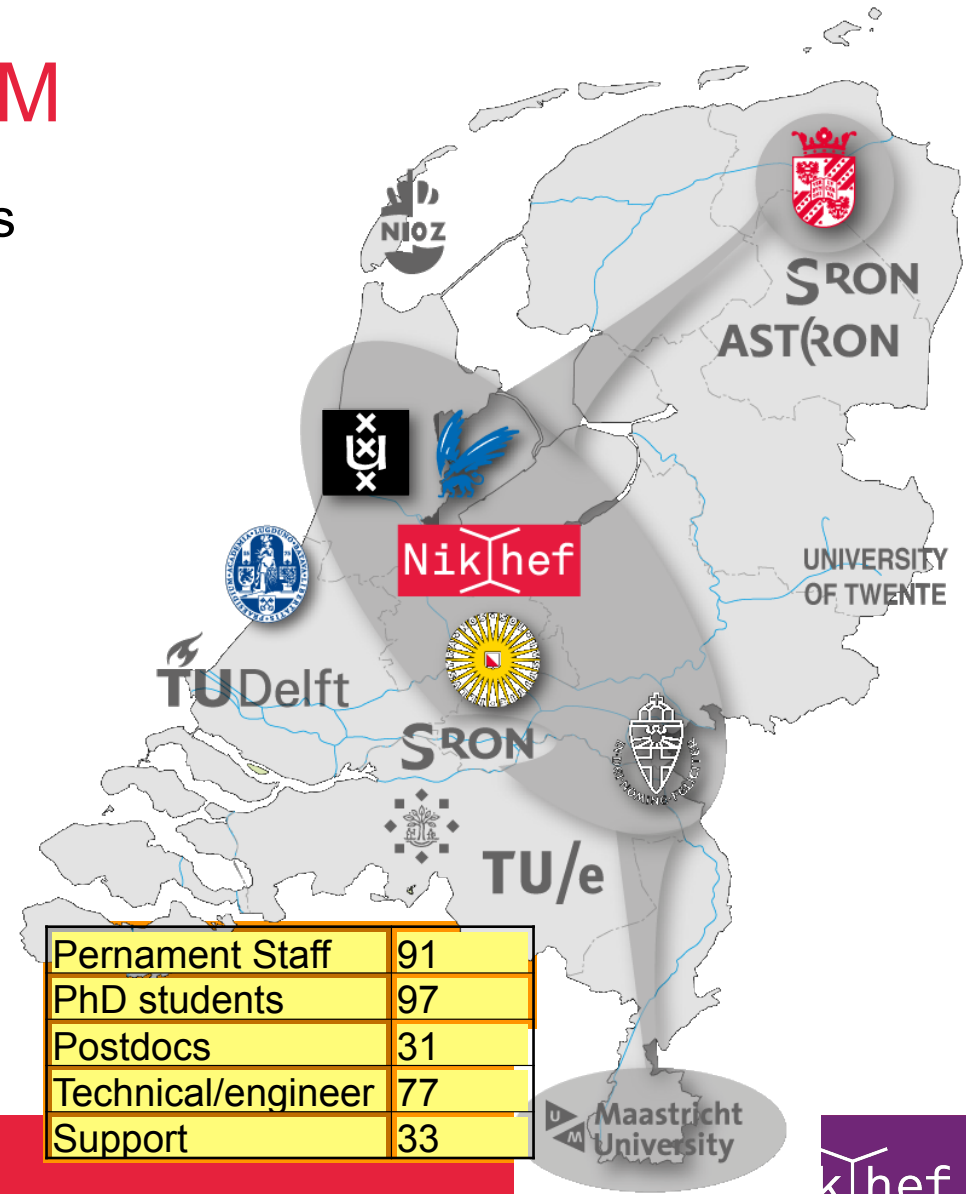
Symbiosis between NWO and University partners

- University partners in key positions
  - Leaders of the scientific programs
- 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

- Reserve fraction of mission funding for OIO/PD
  - On the base of program needs (OPL)





# PEOPLE AT NIKHEF

NWO Universities

## Scientific staff WP/V

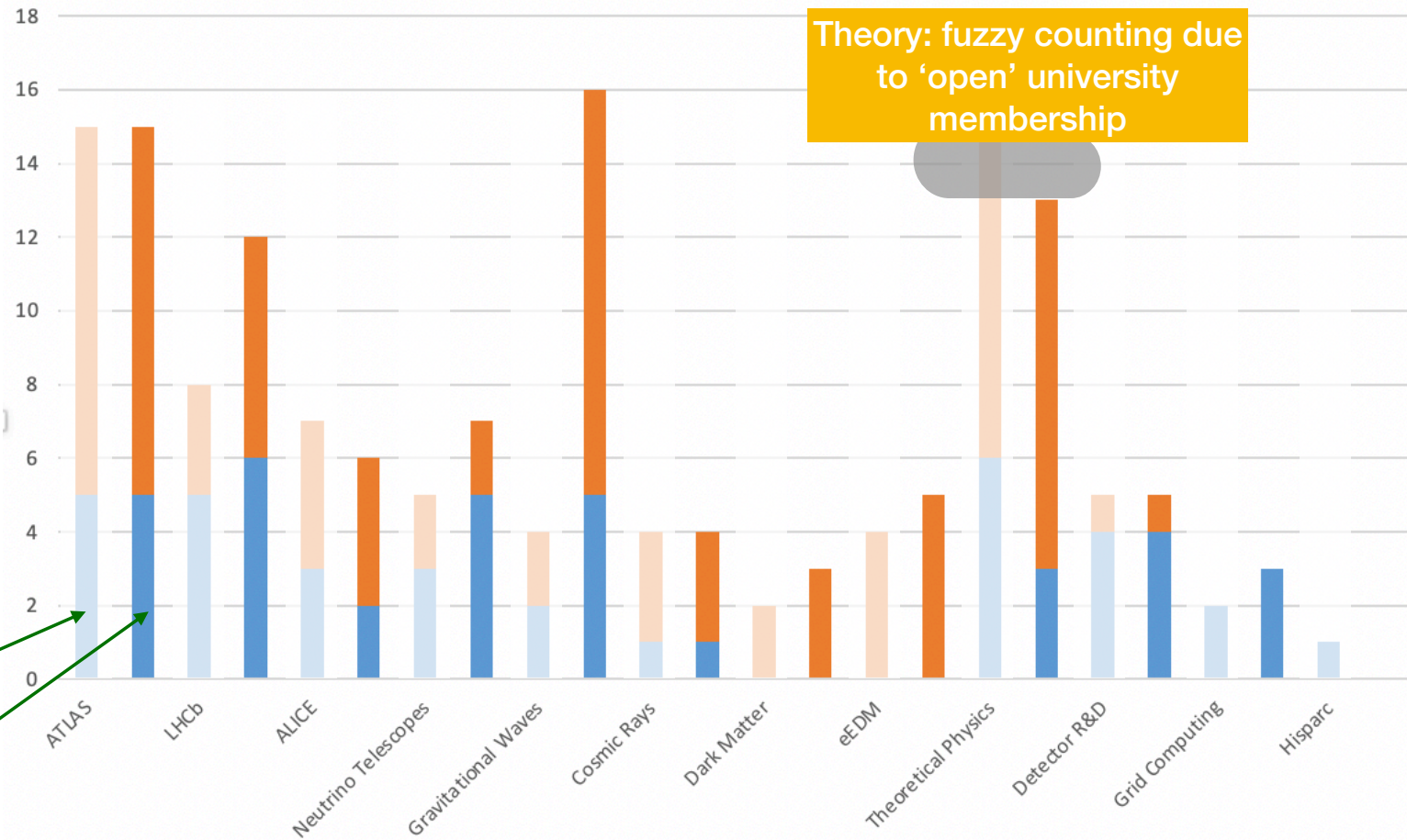
- Comparison between 2017 and 2020 (now)

## Increase of our staff

- New UM group
- Sectorplan positions

~20% female!

2017 2020



# 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

## 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

## 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

# STRATEGY 2017 - 2022

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## What did Nikhef achieve?

- 😊 LHC upgrades in full swing (roadmap funding)
- 😊 KM3NeT2.0 fully started - preparing ERIC (roadmap funding)
- 😊 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)

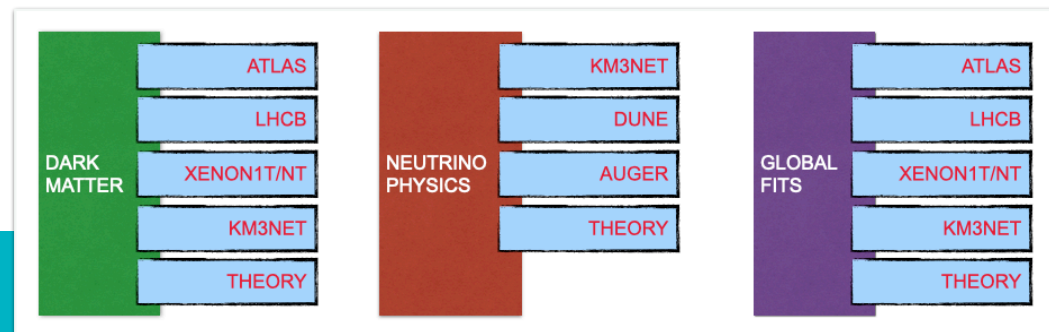
# STRATEGY 2017 - 2022

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## 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



# STRATEGY 2017 - 2022

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## What did we achieve?

- 😊 Industry agenda for ILO and lot of industry activity for ET-NL; P2IP, Innoseis
- 😬 Attract more students from Partner Universities: needs continuous attention
- 😊 Nikhef house-style ready, and renovation building will start in March 2021
- 😞 COVID-19 seriously hampers our outreach activities!

# RECOMMENDATIONS SEP EVALUATION PANEL - 2017

## Research quality

- 😊 Put in place mechanisms that enable vigorous pursuit of hosting ET in the Netherlands
- 😬 Join EGO/VIRGO as full members in view of hosting the ET in the Netherlands.

## Viability

- 😱 Long-term projects require allocation of long-term funding. NWO is encouraged to adapt its funding schemes

## Research integrity

- 😬 Raise more awareness and procedures in case issues arise concerning research integrity

## PhD programmes

- 😬 Urges Nikhef to reduce the duration of the PhD research projects to the nominal 4 years

## Diversity

- 😊 Pleased to see an improvement gender balance and encourages its continuation, also at more senior levels
- 😊 Nikhef is encouraged to write a “Gender Equity Plan”

# MOST RECENT EUROPEAN STRATEGIES

the small ...



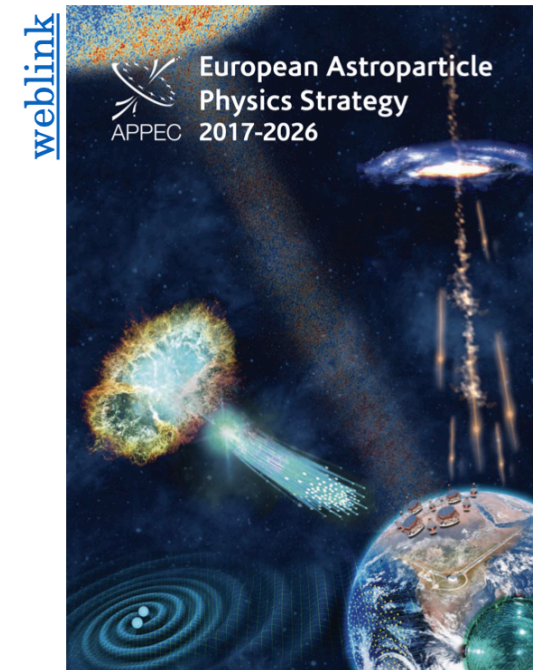
2020 Update of the European Particle Physics Strategy

... the connection ...



Long Range Plan 2017 Perspectives in Nuclear Physics

... the large

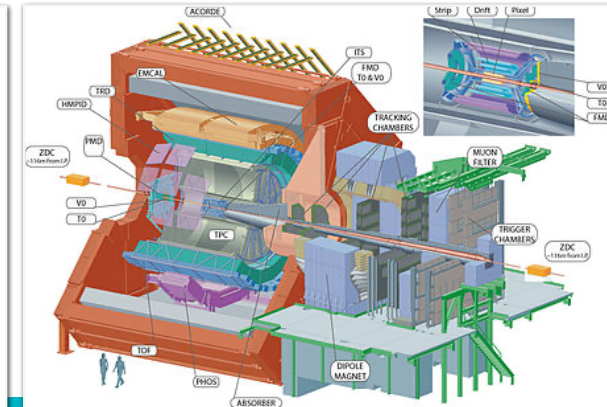
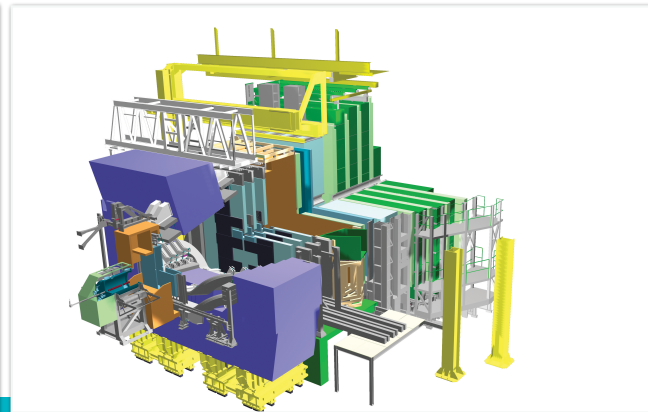
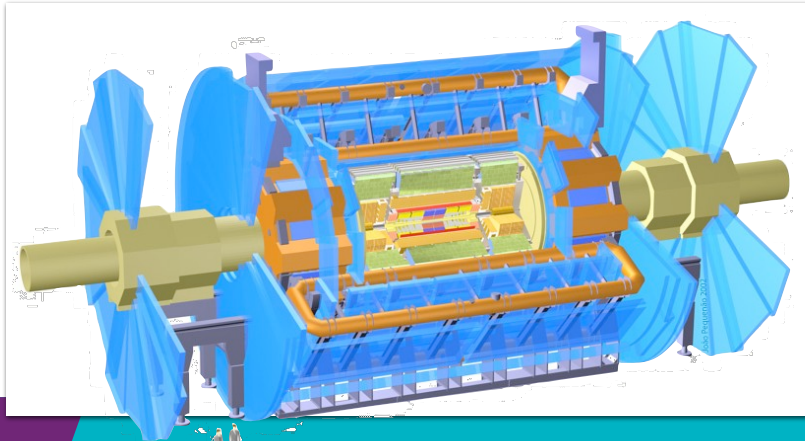


2017-2026 European Astroparticle Physics Strategy

# FUTURE OF HL-LHC > 2030

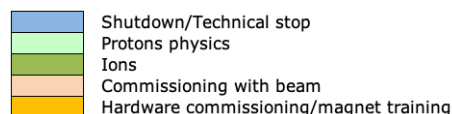
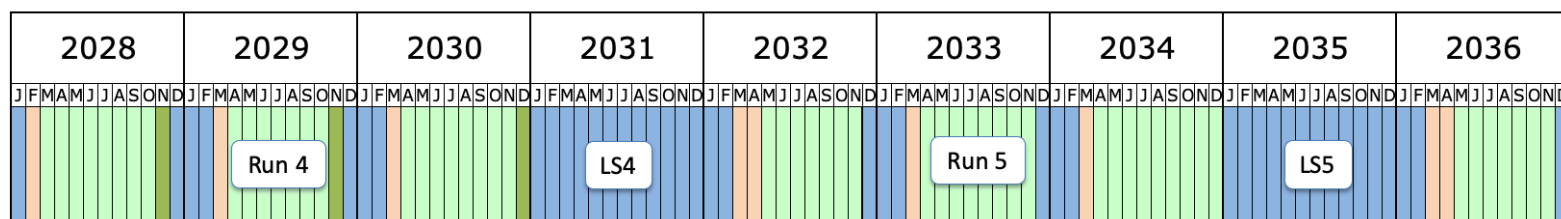
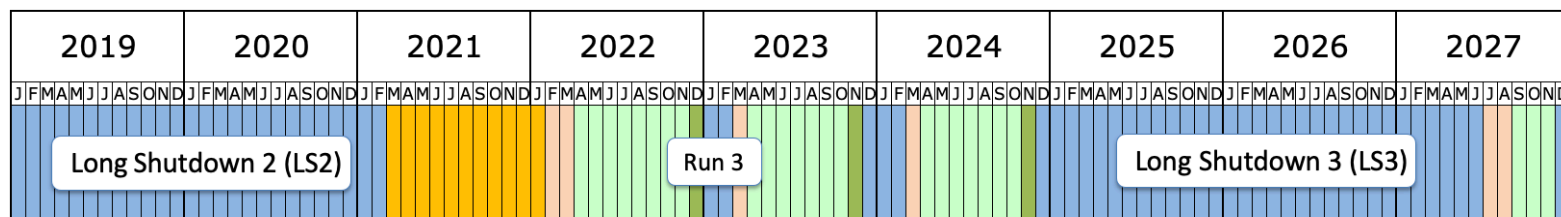
## ESPPU:

- *“The successful completion of the high- luminosity upgrade of the machine and detectors should remain the focal point of European particle physics, together with continued innovation in experimental techniques. The full physics potential of the LHC and the HL-LHC, including the study of flavor physics and the quark-gluon plasma, should be exploited”*





# HL-LHC PROGRAM



Survey: what you like to bring up?

I would like to understand the view of Nikhef management

## Personal view:

- Prepare for a long future of ATLAS, LHCb and ALICE beyond 2030, with potential additional upgrades during LS4 in ~2031
  - The science itself remains interesting & relevant !
  - Key to this success: *the attraction of talent* and recognition of individual contributions

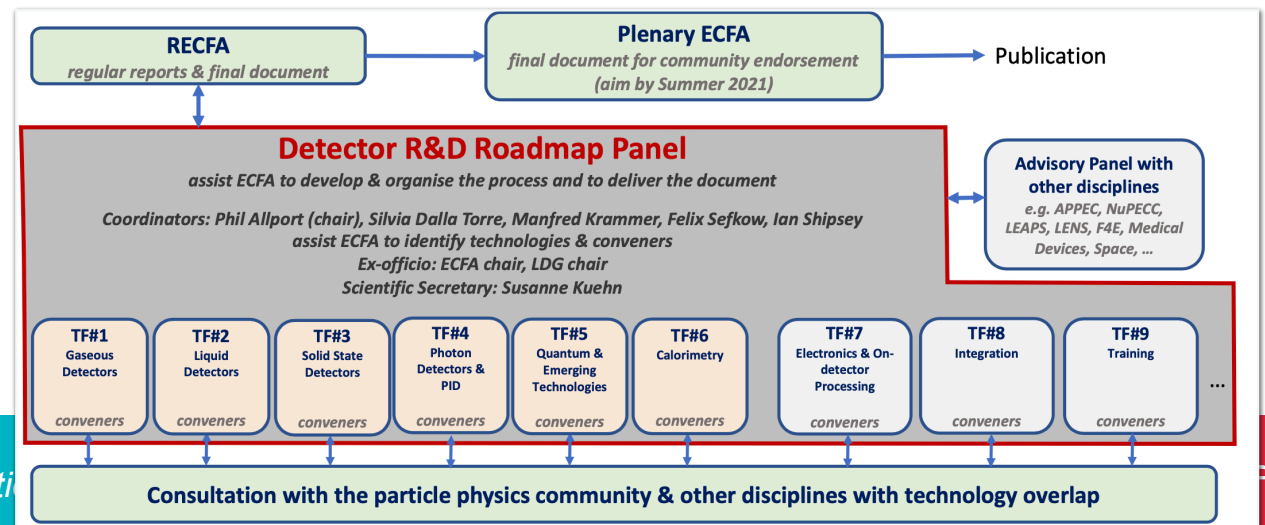
# DETECTOR R&D ROADMAP

## ESPPU:

- *Detector R&D programmes and associated infrastructures should be supported at CERN, national institutes, laboratories and universities. ... The community should define a global detector R&D roadmap that should be used to support proposals at the European and national levels.*

## ECFA has started to organise the roadmap

- Presence of Nikhef well appreciated & anticipated



# NIKHEF DETECTOR R&D ROADMAP

## Personal view

- Nikhef should further develop a strong, focused and coherent R&D programme:
  1. Optimize and develop available competences *in-house* (R&D, ET, CT, ...)
  2. Clients are detector upgrades of the LHC experiments in LS4 - *and others*
  3. Beyond LHC: instrumentation for detectors @FCCee, DUNE, ILC, ...
- Opportunities *to be discussed*
  - *Tracking*: Smart pixel detectors with ultra fast timing (hybrid and monolithic)
  - *DAQ*: State-of-the-art technologies e.g. FELIX
- Nurture existing expertise
  - Full responsibility for the construction & running of complete detector systems

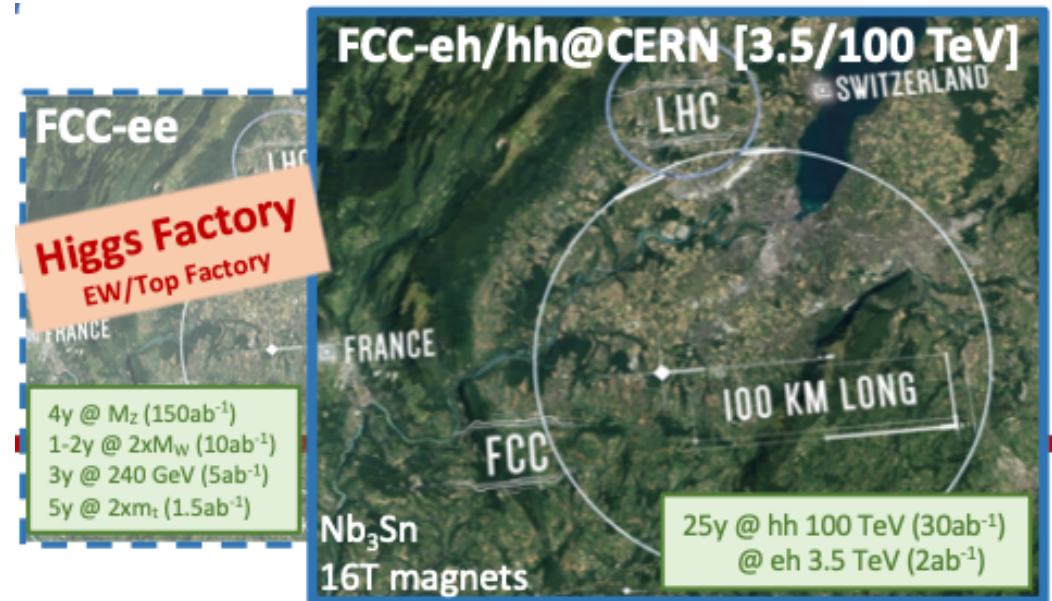
# POST-LHC ERA

## ESPPU

- “Given the unique nature of the Higgs boson, there are compelling scientific arguments for a new electron-positron collider operating as a “Higgs factory”. The vision is to prepare a Higgs factory, followed by a future hadron collider with sensitivity to energy scales an order of magnitude higher than those of the LHC, while addressing the associated technical and environmental challenges.”

## Personal view

- A huge statue in honor of Fabiola if the FCC tunnel will be built!
- Continue with a flexible and broad e+e- community at Nikhef (FCCee/CLIC/ILC)
- Detector development as part of our R&D program - as we are not involved in accelerator R&D



by around 2026, verify if it is feasible to plan for success (techn. & adm. & financially & global governance)

# LDG - ROADMAP ON ACCELERATORS

## ESPPU

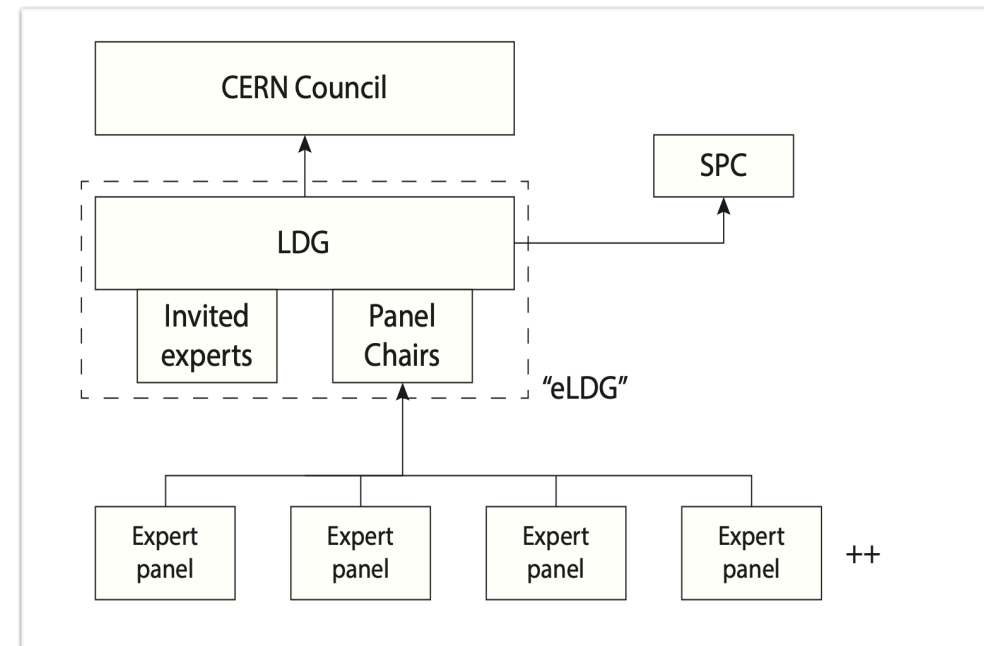
- *The European particle physics community must intensify accelerator R&D and sustain it with adequate resources. A roadmap should prioritise the technology*

## LDG will produce the accelerator roadmap

- Roadmap loaded with vision/prioritizations:
  - High field superconducting magnets
  - Muon colliders
  - ERL: energy recovering linac
  - High field gradient acceleration

## Expert panels are now being installed

- Start with the convenors as experts in the fields
- Nikhef is not a main actor in this field
- Let me know your interest



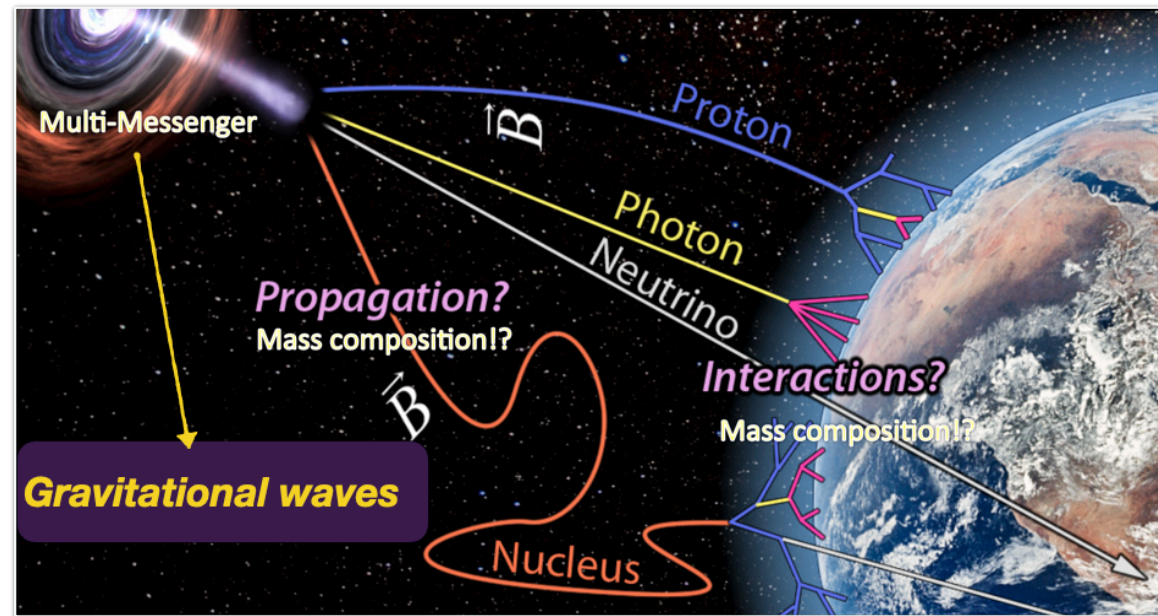
# ASTROPARTICLE PHYSICS

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
    - New CAN memberships have been installed recently, together with astronomy

Portfolio Nikhef APP

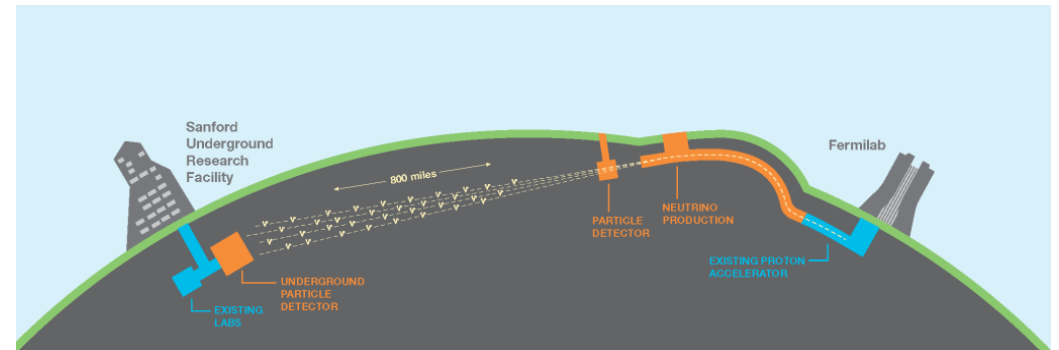
- Well balanced
- All particles/fields except (hard) photons



# ASTROPARTICLE PHYSICS

To discuss next year in VistaUpdate:

- Neutrino physics
  - After construction 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?
- PTOLEMY as (relatively modest) add-on experiment in LNGS?
- Looking beyond the eEDM experiment at RUG?
- ...



# EINSTEIN TELESCOPE

Survey: what you like to bring up?

Is gravitational waves growing over our heads?

Einstein Telescope has become a focal point of attention

- See the presentation of Stefan Hild this afternoon
- Growing communities in- and outside Nikhef
- University partners, NWO, Limburg province, technical universities, industry, TNO, ...

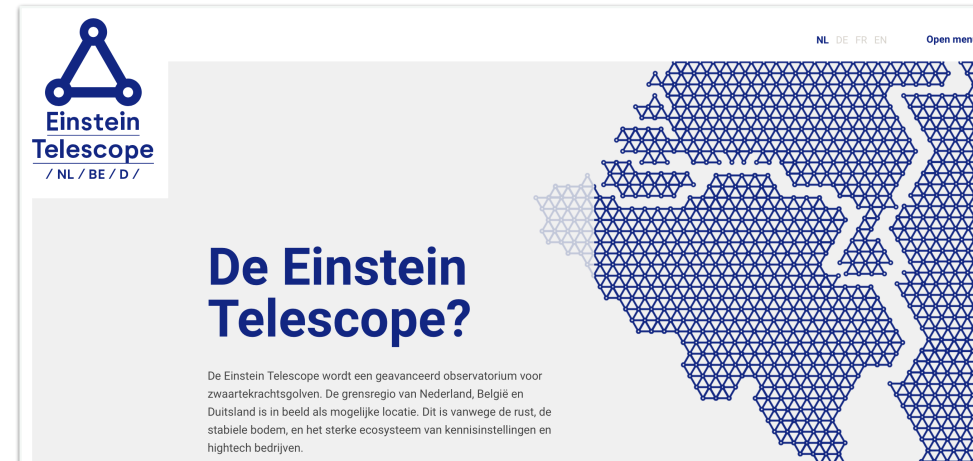
Scenario's for ET

1. *There will be no ET in Europe*
2. *ET in Sardinia*
3. *ET in Meuse-Rhine area*
4. *Multiple ET sites, e.g. with L-shape*

ETpathfinder will be a beautiful R&D facility

- Relevance irrespective of ET scenario

<https://www.einsteintelelescope.nl>





# STATUS OF ET

## ET-NL coordination team

- Setting was provided by our minister:
  - Scientific relevance
  - Suitability geology in Limburg;
  - Business case with impact on the economy;
  - Costs / benefits of the Sardinia location and access to Dutch researchers.
  - Strengthening cooperation in the Euregio Meuse-Rhine

## ESFRI proposal submitted

- Timeline for ET
  - Design phase (2008 - 2017, 5ME)
  - Preparatory phase (2018 - 2027, 171ME)
  - Implementation phase (2026 - 2035, 1736ME)
  - Exploitation phase (2035 - 2080, 37ME / yr)

Site selection (IT, NL) planned for 2025

## Letter Van Engelshoven to our Parliament, 18.12.2018

De bouw van de Einstein Telescoop vergt een zeer grote financiële investering (huidige schatting is meer dan € 1 miljard), waarvoor op grond van een aantal criteria een gedegen afweging gemaakt zal moeten worden. In de eerste plaats is dat de wetenschappelijke relevantie van deze onderzoeksfaciliteit. Ten tweede is dat de fysieke geschiktheid van de bodem in Zuid-Limburg. Ten derde moet er een goede business case worden gemaakt samen met onze buurlanden, België en Duitsland, waarin ook de impact op de (regionale) economie wordt meegenomen. Tot slot dienen we dit ook af te wegen tegen de kosten en baten van een alternatieve locatie en de toegang van Nederlandse wetenschappers hiertoe.

European Strategy Forum on Research Infrastructures ESFRI

Strategy Report on Research Infrastructures

# ROADMAP 2021

**Einstein Telescope (ET)**

Proposal Submission  
Questionnaire  
11th August 2020

See the talk of Stefan

# EINSTEIN TELESCOPE

## Personal view

- 1. It will be a **big** loss if ET will not be realised in Europe
  - The science is too beautiful to leave this to other communities, outside physics!
  - I hope one day CERN will realise its importance, and step-in.
- 2. ET in Sardinia? Nikhef should contribute to its success!
  - We are developing a unique and world-class expertise on interferometry
  - Contribute on a similar level as other large international projects, e.g. ATLAS
  - Investment funding via National Roadmap
- 3. ET-NL? A national facility to be proud of!
  - Decision on national level, together with Germany and Belgium + other EU
  - Governance is completely unclear
- 4. Multiple-site ET? Lets not complicate things now...

# A FEW REMARKS

*Survey: what you like to bring up?*

The elephant in the room will be GW/ET I fear. One way or another it would be good for Nikhef to establish much more intense links between GW people on the one hand and Standard Model people on the other hand.

## Communities @Nikhef

- 1. The lifeline of Nikhef is closely tied to CERN
- 2. The non-CERN community is growing at Nikhef
  - *Personal view: Keep a sensible balance:*  
The size of the CERN activities should not become smaller than non-CERN activities

## Increase scientific & instrumental dialogue!

- We have a diverse portfolio and communities are separate
  - Instrumentation for detector physics and interferometry are very different
  - This outcome of the survey will be on the agenda of the OPL
- *Pro-active to discuss mutual interest and overlap in science programs*

# ATTRACTING TALENT

Your personal scientific motivation for working at Nikhef:

- Enthusiastic responses
- Nikhef is a great place to work!

Still, many of you (including me) worry about attracting new talent

- Compile action list
  - On agenda of OWC / OSAF
  - Recognition of individuals on agenda of ECFA

*Survey: what you like to bring up?*

How can dual membership of LHC experiment and AP experiment be realized? This could be major attraction to new talent.

Our main attention should go out to establish career perspectives of young scientists (PhDs and postdocs). To implement a broad training of PhDs I propose that each PhD track should include a physics data analysis part as well as a technology (hardware, software/computing) part.

How can we support our PhD students and postdocs better in their careers?

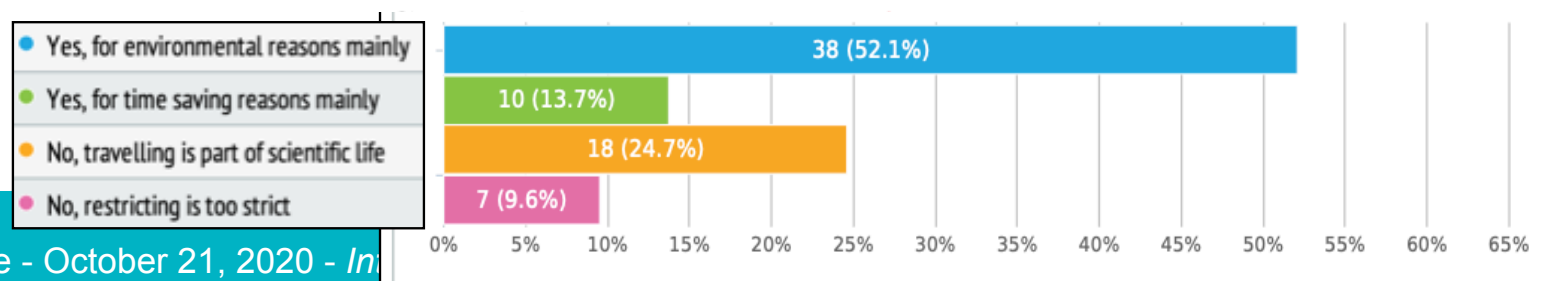
What can we do to make sure that the creativity of young people is not stifled in large collaborations and their work ignored?

# SUSTAINABILITY WORKSHOP

## Roadmap toward carbon neutrality at Nikhef by 2030

- Initiative co-initiated by the working council
  - Arjen van Rijn, Jan Visser, Rasa Muller, Jesse van Dongen, Sascha Caron
- Travel reduction may be an important ingredient
  - Above 1 ME (between 1.0 - 1.2 million euro)
  - In how far is your work really hampered during CIVID-19?
- Other measures will be investigated
  - Upto the level of energy reduction at the next collider

### I am willing to restrict long distance traveling for work



Enjoy today!