



Astroparticle Physics European Consortium

***European Astroparticle Physics strategy  
with focus on Gravitational Waves  
ambitions***

***Job de Kleuver, APPEC  
ET-symposium, Univ. Liege, 31 January 2018***





# Astroparticle Physics European Consortium

**CERN**



**ESO/ESA**



**APPEC**



# Astroparticle Physics European Consortium



APPEC 2018

RIA (Ireland)

STFC (UK)

FOM (NL)

FRS-FNRS, FWO (Belgium)

CEA, CNRS (France)

SNSF (Switzerland)

LSC (Spain)

FCT (Portugal)

OSI (Finland)

VR (Sweden)

DESY, KIT (Germany)

JINR (Dubna, Russia)

NCN (Poland)

IEAP-CTU (CZ)

INFN (Italy)

IFIN-HH (Romania)

CSF (Croatia)

NOA (Greece)

Observers: CERN, ECFA, ESO, NCN, CSF





APPEC

# Astroparticle Physics European Consortium



## General Assembly

Catherine De Clercq

Laurent Favart

Jorgen d'Hondt – ECFA observer



## Strategic objectives

- Coordination of European Astroparticle Physics
- Develop and update long term strategies (roadmap)
- Express collective views on APP in international fora

## Implementation objectives

- Coordination between existing/developing national activities
- Convergence of future large scale projects/facilities
- Organisational advice for implementation of large facilities
- Launch common calls funded by a (virtual) common pot





# Astroparticle Physics European Consortium



European Astroparticle  
Physics Strategy  
APPEC 2017-2026

## Roadmap 2017 – 2026

## 21 recommendations







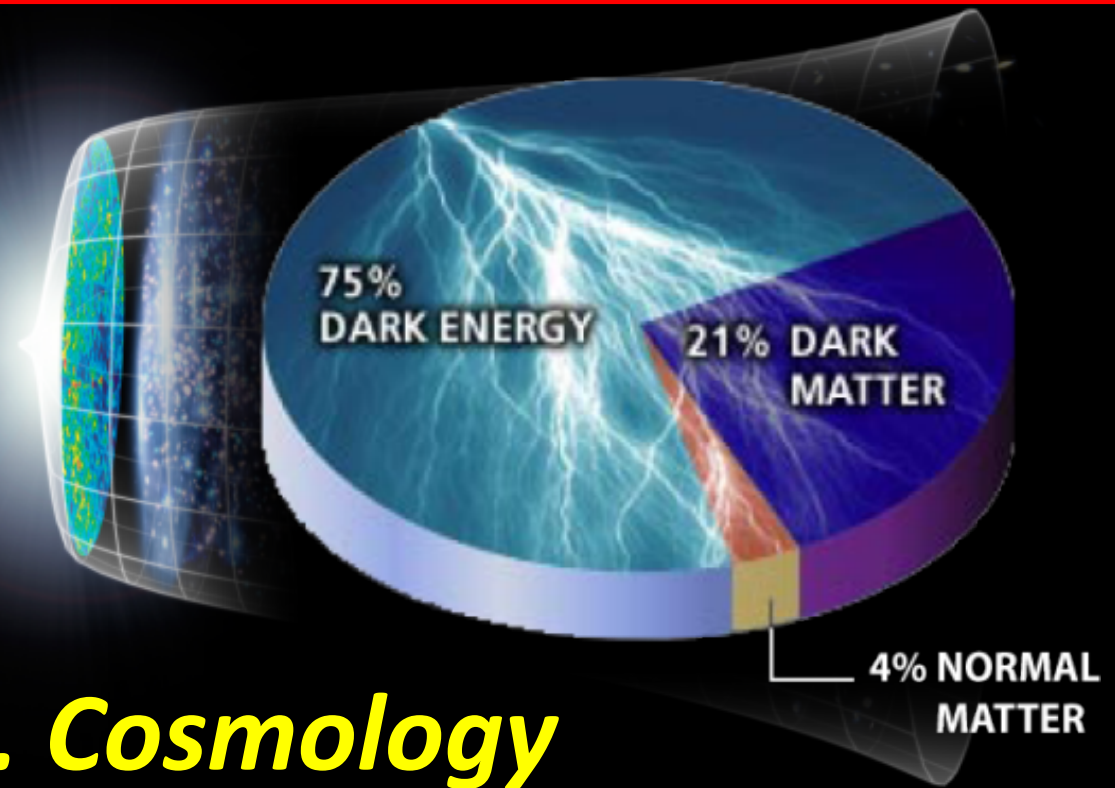
## 1. High-energy Universe: multi-messengers



## 2. Neutrino's



## 3. Cosmology





# Astroparticle Physics European Consortium



## Organisational issues

- European Commission
- European Coordination
- Global collaboration/coordination
- Particle physics & Astronomy
- Inter-disciplinary opportunities

## Societal issues

- Gender balance
- Education & Outreach
- Industry





# Astroparticle Physics European Consortium

## Crucial ingredients

**community**

*EU: few 1000  
scientists*

**science**

*excellent*

**technology**

*state-of-the-art*



# Astroparticle Physics European Consortium

APPEC's "own" annual cash budget: only 80 k€







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APPEC's "own" annual cash budget: only 80 k€

## ***Bright side:***

APP investments  
~75 M€/year

national funding  
partner countries

## ***Opportunities:***

- Regional €'s
- EU ERDF
- Growing field
- Collaboration
- Interdisciplinary
- ...

***Need for coordination and collaboration***



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## European *research infrastructures* roadmap: *ESFRI*

European Strategy Forum on Research Infrastructures **ESFRI**

**STRATEGY REPORT ON RESEARCH**

**PL**  
Projects Landmarks

**ROADMAP 2016**

<b>CTA</b>	Cherenkov Telescope Array
<b>EST</b>	European Solar Telescope
<b>KM3NeT 2.0</b>	KM3 Neutrino Telescope 2.0: Astroparticle & Oscillations Research with Cosmics in the Abyss

**1**

**ESFRI PROJECTS**

NAME	FULL NAME	STARTUP YEAR (YR)	OPERATION (YR)	LEGAL STATUS (AGREEMENT)	CONSTRUCTION COST (M)	OPERATIONAL PHASE BUDGET (M)
<b>ENV</b>	<b>CCSC</b>	2008	2016	ERIC under preparation	80-120	1**
	<b>EU-SOLARES</b>	2010	2020*	ERIC under preparation	120	3-4
	<b>MYRRHA</b>	2010	2020*		NA	100
	<b>WindScanner</b>	2010	2018*		45-60	0
<b>ACTS</b>	<b>ACTS</b>	2016	2025*		190	50
	<b>DAHUBUS-RI</b>	2016	2022*		22	28
<b>SR</b>	<b>KM3NeT 2.0</b>	2016	2020*		90	3
	<b>CRIS</b>	2016	2022*		4	5

\*expected \*\*for controlled access \*\*\*not available





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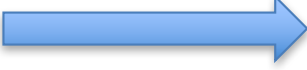
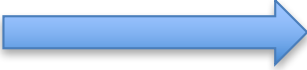
National roadmaps:  
*APP well represented*



Next steps:  
funding decisions,  
competitions, ...



## Collecting European Funding

Czech Republic		5,52 M EUR
The Kingdom of Denmark		230 M EUR
The Federal Republic of Germany		202,5 M EUR
The Republic of Estonia		4,61 M EUR
The French Republic		147 M EUR
The Italian Republic		110,6 M EUR
Hungary		17,6 M EUR
The Kingdom of Norway		46,07 M EUR
The Republic of Poland		33,2 M EUR
The Kingdom of Sweden		645 M EUR
The Swiss Confederation		64,5 M EUR

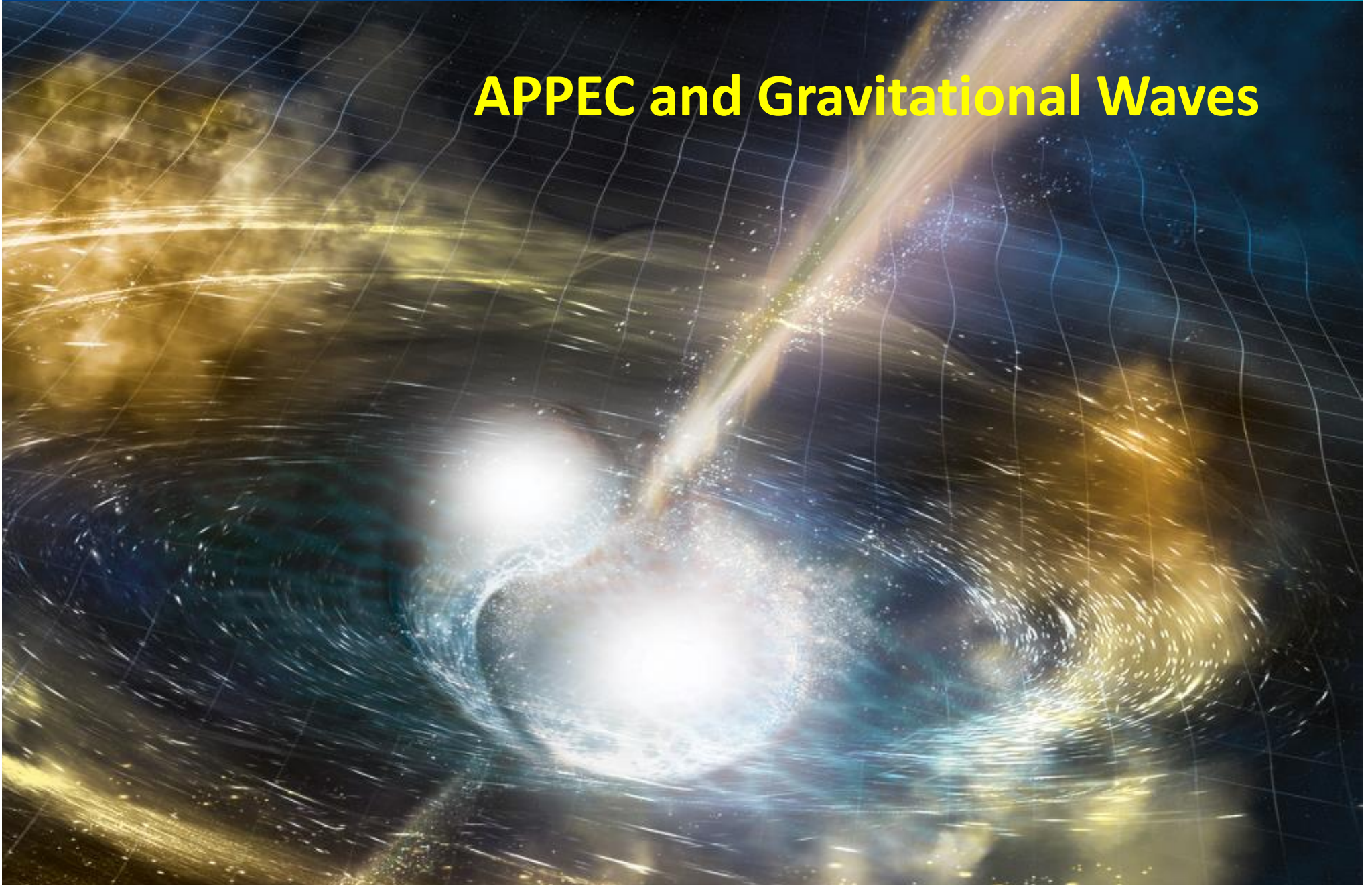
*European Spallation Source*  
*~ 1500 M EUR*





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## APPEC and Gravitational Waves







## APPEC and Gravitational Waves (1)



With its global partners and in consultation with the Gravitational Wave International Committee (GWIC), APPEC will define timelines for upgrades of existing as well as next-generation ground-based interferometers.

APPEC strongly supports further actions strengthening the collaboration between gravitational-wave laboratories.





## APPEC and Gravitational Waves (1): **actions**

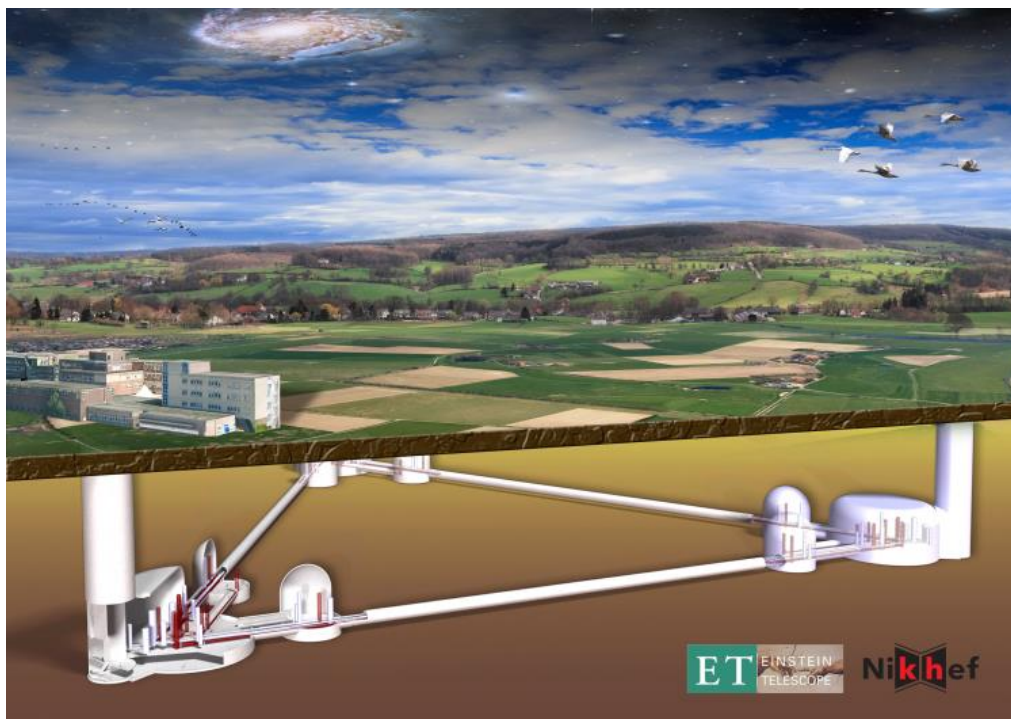


- Explore interest of new groups/countries to join the European GW research community
- See Advanced Virgo as a gateway to Einstein Telescope
- Develop a vigorous R&D program for present (Advanced LIGO/Virgo) and future (ET) detectors



## APPEC and Gravitational Waves (2)

It also strongly supports Europe's next-generation ground-based interferometer, the Einstein Telescope (ET) project, in developing the required technology and acquiring ESFRI status.

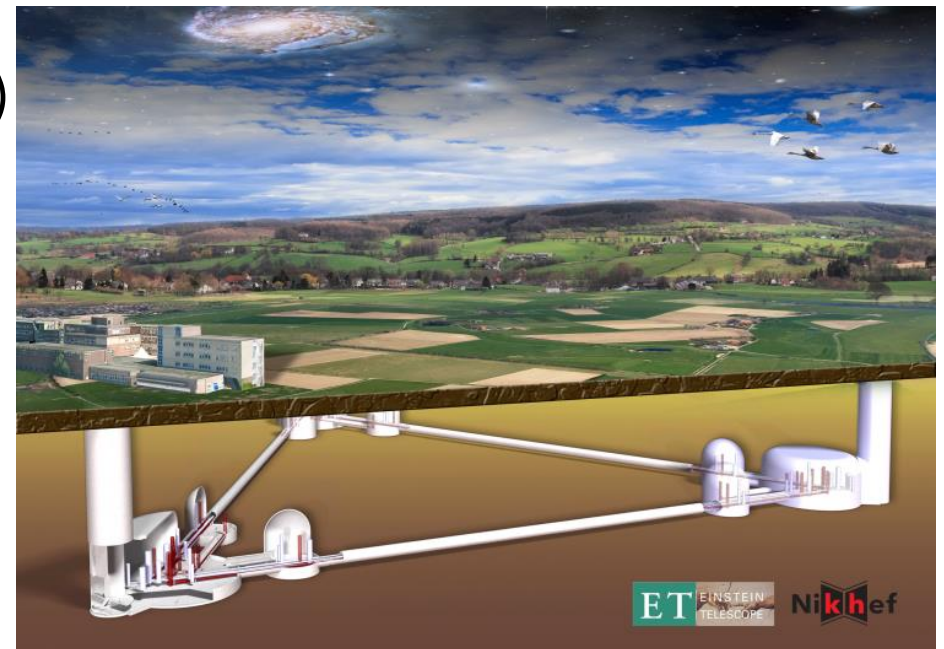






## APPEC and Gravitational Waves (2): **actions towards Einstein Telescope**

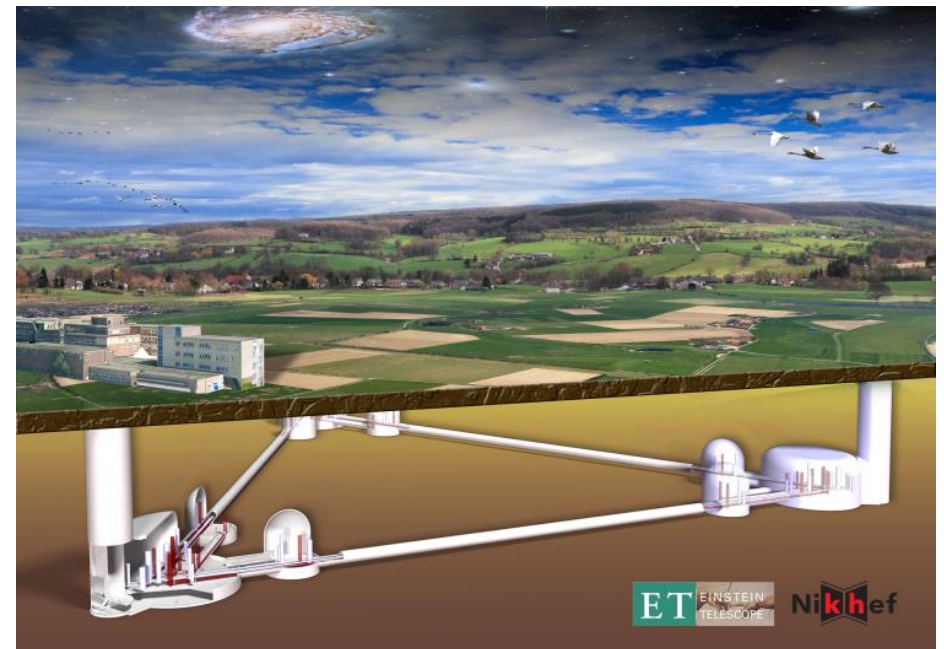
- Support GWIC developing an exciting science case (global)
- Collective European view on the level of research organisations and funding agencies
- Preparations for an ESFRI-proposal in 2019, including
  - Governance model mature
  - Site selection bid procedure (2020/21) and at least site candidate(s)





## APPEC and Gravitational Waves (2): **actions towards Einstein Telescope**

- Support forming an ET-collaboration and preparation of a Lol
- Influencing frame work programmes EU (H2020 and FP9)
- Develop strategies (on European or global level) on:
  - Computing
  - Socio economic impact
    - Spin offs, technology transfer
    - Creating Jobs
    - Impact on region
  - Value of global collaboration

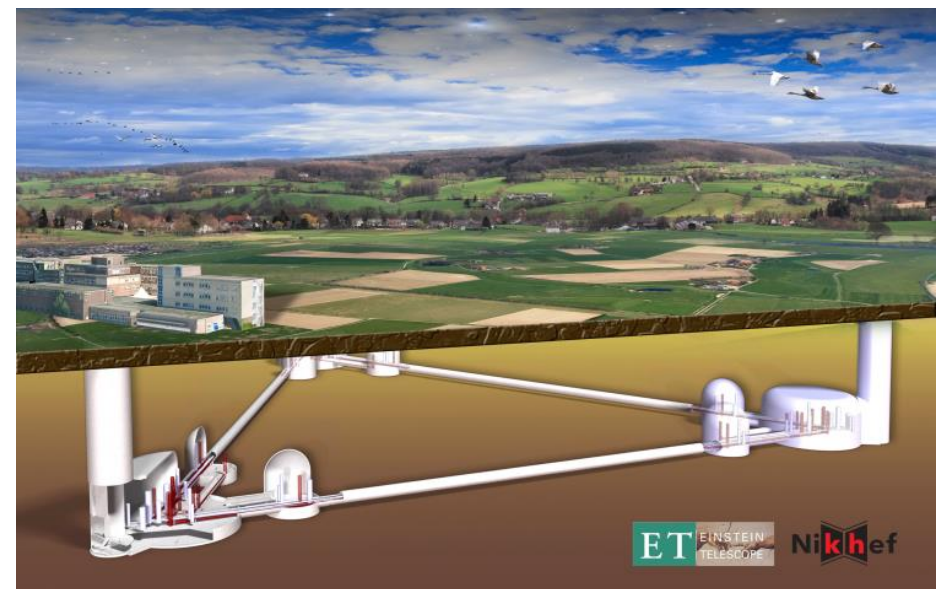






## **My messages for your Einstein Telescope meeting:**

- Extraordinarily exciting time for our comprehension of the Universe
- Attraction power to students, young researchers and technicians
- Potential high impact on growth and innovation
- **Industry, politics and science have to act in consort**





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*Thank you!*

*[www.appec.org](http://www.appec.org)*

*[j.dekleuver@nwo.nl](mailto:j.dekleuver@nwo.nl)*





## APPEC and Gravitational Waves (3)

In the field of space-based interferometry, APPEC strongly supports the LISA proposal.

