

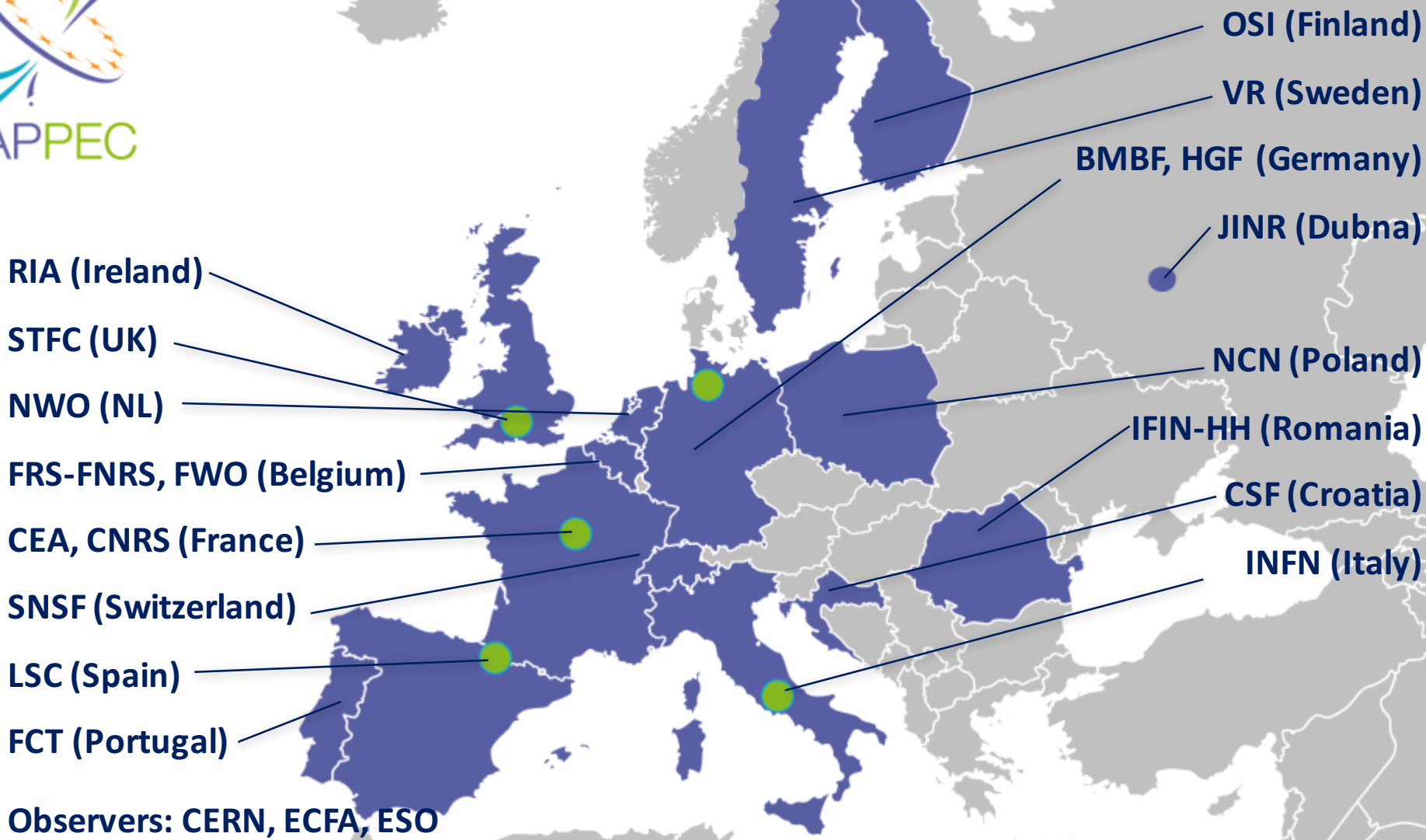


***Astroparticle Physics in Europe:
via our new roadmap towards more
collaboration and coordination***

Job de Kleuver, APPEC

Dawn III Workshop, Syracuse, NY, 7 July 2017

APPEC Consortium



RIA (Ireland)

STFC (UK)

NWO (NL)

FRS-FNRS, FWO (Belgium)

CEA, CNRS (France)

SNSF (Switzerland)

LSC (Spain)

FCT (Portugal)

Observers: CERN, ECFA, ESO

OSI (Finland)

VR (Sweden)

BMBF, HGF (Germany)

JINR (Dubna)

NCN (Poland)

IFIN-HH (Romania)

CSF (Croatia)

INFN (Italy)



Astroparticle Physics European Consortium



General Assembly

Stavros Katsanevas 2012 – 2014

Frank Linde 2015 – 2016

Antonio Masiero 2017 –

Joint Secretariat

Thomas Berghöfer 2012 – 2016

Job de Kleuver 2017 –

Strategic objectives

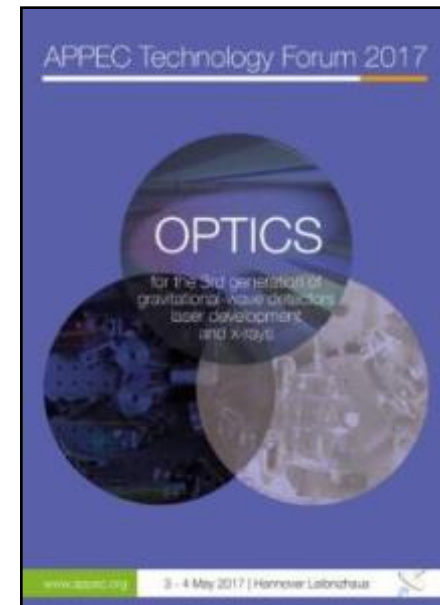
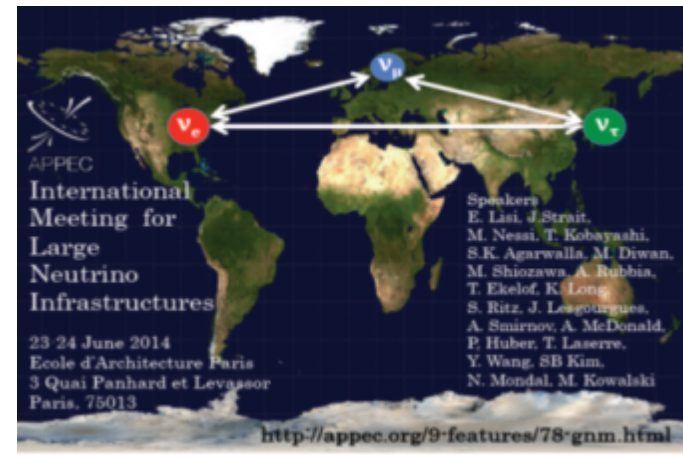
- Coordination of European Astroparticle Physics
- Develop and update long term strategies (roadmap)
- Express collective views on APP in international fora

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

Successes of APPEC

- Global neutrino meetings
- European CMB coordination
- CTA in its early stage
- APPEC Technology Fora
- Common projects (ET, DARWIN)
- Roadmap





Astroparticle Physics European Consortium

2008

2011

2017

Preparations

Town meeting





Astroparticle Physics European Consortium

APPEC Town Meeting => APPEC Strategy

Wednesday 6 April

Time	Topic	Speaker	Moderator
09:00-10:00	Registration - Welcome coffee		
10:00-10:15	Opening & Introduction	Antonio Masiero APPEC SAC Chair	Antonio Masiero APPEC SAC Chair
10:15-11:00	HE-Universe - Gamma	Felix Aharonian	Christian Spiering
11:00-11:45	HE-Universe - Neutrino	Giola Anton	Staslaus Beutvelsen
11:45-12:50	HE-Universe - Cosmic rays	Andreas Haungs	Johannes Blümer
12:30-14:00 Lunch - Buffet			
14:00-14:30	Multimessenger study of the Universe - Theory	Roger Blanford	Antonio Masiero
14:30-15:00	Current problems in cosmology - Theory	Subir Sarkar	Lars Bergström
15:00-15:30	Current problems in neutrino - Theory	Eligio Lisi	Janet Siegel
15:30-16:15 Coffee			
16:15-17:00	Neutrino parameters with large experiments (CP violation, mass hierarchy...)	Mauro Mezzetto	Federico Ferrar
17:00-17:45	Lepton number violation and basic neutrino properties	Andrea Giuliani	Stefano Ragazzi
17:45-18:30	Cosmology - Dark Matter	Jocelyn Moore	Mario Martinez
18:30-18:45 Break			
18:45-19:30	T. Kajita public lecture	Takaaki Kajita	Stavros Katsanevas
19:15-20:15 Cocktail			

Thursday 7 April

Time	Topic	Speaker	Moderator
09:30-10:15	Cosmology - CMB	Francois Bouchet	Stavros Katsanevas
10:15-11:00	Cosmology - Dark Energy	Ramon Miquel	Reynald Pain
11:00-11:45 Coffee			
11:45-12:30	HE-Universe - Gravitational Waves	Patrick Sutton	Federico Ferrar
12:30-13:00	APP Computing	Volker Beckmann	Katharina Henjes-Kunst
13:00-14:30 Lunch - Buffet			
14:30-15:00	APP - Detector R&D, Industry	Jo v/d Brand	Teresa Montaruli
15:00-17:00	Round table with international agencies (CERN, ASTRONET, ESO, DOE, NSF, CANADA, CHINA, JAPAN)	F. Giannotti (CERN), R. Génova (ESO), K. Turner (DOE), J. Whitmore (NSF), T. Kajita (Japan), SN Zhang (China), N. Smith (Canada), C. Vincent (Astronet), M. Carena (Fermilab)	Stavros Katsanevas
17:00-17:45 Coffee			
17:45-18:15	Conclusions, APPEC, community, roadmap, funding alignment, international coordination	Frank Linde APPEC Chair	Frank Linde APPEC Chair

Paris, April 2016

Recommendations accepted November 2016, Stockholm
Full roadmap available Summer 2017



Astroparticle Physics European Consortium

2008



2011



2017

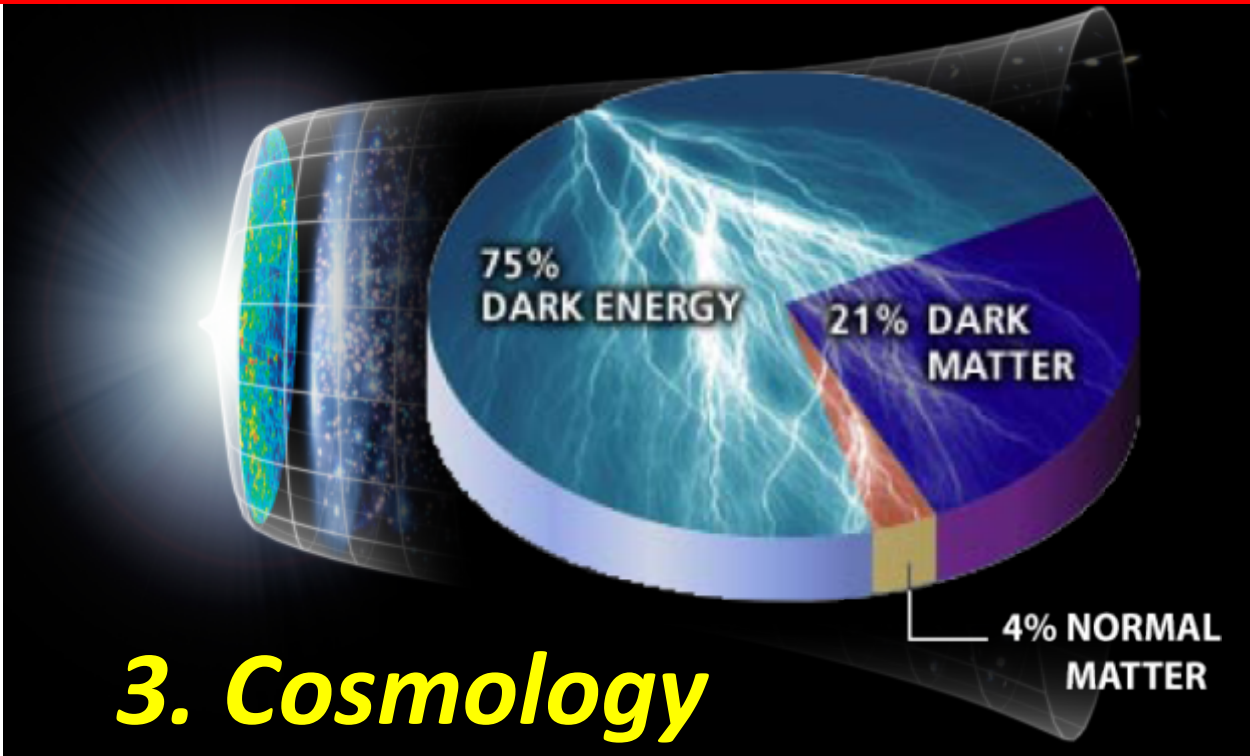





1. High-energy Universe: multi-messengers



2. Neutrino's



3. Cosmology



European Astroparticle
Physics Strategy
2017-2026

Organisational issues

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

Societal issues

- Gender balance
- Education & Outreach
- Industry

APPEC Coordination and collaboration

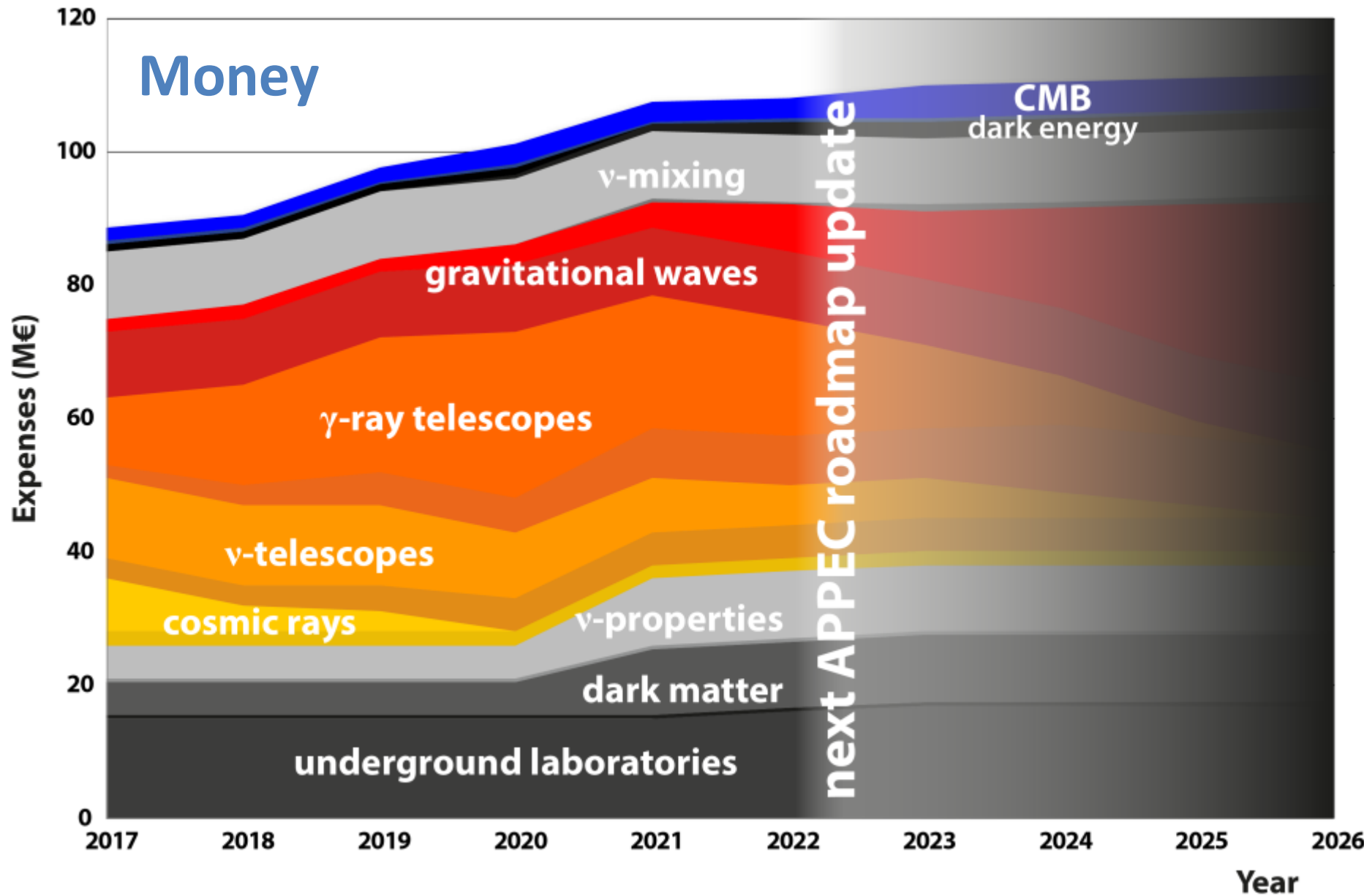
- **Small scale experiments**
 - e.g. R&D initiatives, ...
 - no need for European coordination
- **Mid scale experiments**
 - e.g. Virgo, XENON1t, KATRIN, ...
 - national/international coordination among institutes/funding agencies
 - monitoring by APPEC
- **Large scale experiments/infrastructures**
 - e.g. CTA, KM3NeT, ET, DARWIN, ...
 - coordination by APPEC

APP Facts of the (recent) past

- Some European countries participate in US projects
 - LIGO (GW), IceCube (neutrino astronomy), LZ (Lux-Zeplin, DM)
- Some European countries participate in European projects
 - Virgo (GW), KM3NeT (neutrino science), XENONnT (DM)
- Small and mid scale projects: no problem
- Large projects
 - Need for collective European view and global coordination



Astroparticle Physics European Consortium



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



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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





Astroparticle Physics European Consortium

European roadmaps in fields of science



European *research infrastructures* roadmap: *ESFRI*



STRATEGY REPORT ON RESEARCH

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



ROADMAP 2016

1 ESFRI PROJECTS							
NAME	FULL NAME	STARTING DATE (YHR)	OPERATION (YHR)	LEGAL STATUS (AGREEMENTS)	CONSTRUCTION COST (M)	OPERATIONAL BUDGET (M/YEAR)	
SDT	ECCSEL	European Carbon Dioxide Capture and Storage Laboratory Infrastructure	2008	2016	ERIC under preparation	80-120	1**
	EU-SOLARS	European SOLAR Research Infrastructure for Concentrated Solar Power	2010	2020*	ERIC under preparation	120	3-4
	MYRRHA	Multi-purpose Hybrid Reactor for High-tech Applications	2010	2024*		NA	100
	WindScanner	European WindScanner Facility	2010	2018*		45-60	8
G	ACTRES	Aeroclim, Clouds and Trace gases Research Infrastructure	2016	2025*		190	50
	DAHURIUS-II	International Centre for Advanced Studies on River-Sea Systems	2016	2022*		222	28
G	ESCAT 2D	Next generation European land-based cosmic ray detector	2008	2014*		70	8
	CTA	Cherenkov Telescope Array	2023*	297	20		
	EST	European Solar Telescope	2026*	200	9		
G	KM3NeT 2.0	KM3 Neutrino Telescope 2.0: Astroparticle & Oscillations Research with Cosmics in the Abyss	2020*	92	3		
	KM3NeT 2.0	KM3 Neutrino Telescope 2.0: Astroparticle & Oscillations Research with Cosmics in the Abyss	2016	2020*		92	3
G	ERIC	European Research Infrastructure for Heritage Science	2016	2022*		4	5

* projected **for controlled access NA: Not Available



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National roadmaps:
APP well represented



Next steps:
funding decisions,
competitions, ...



Collecting European Funding

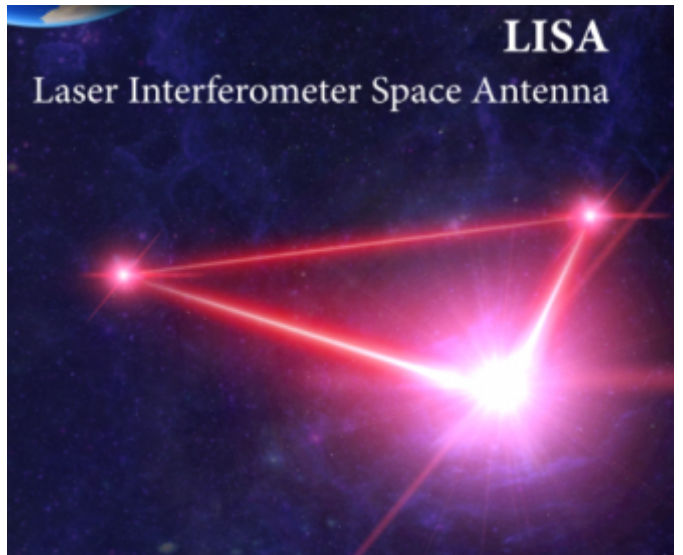
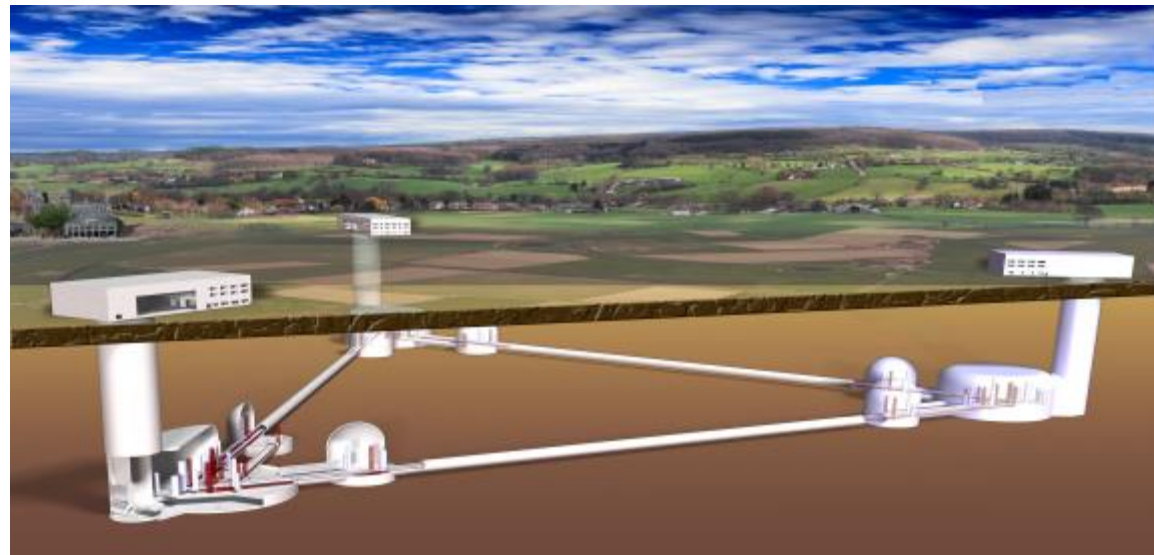
Czech Republic	5,52 M EUR
The Kingdom of Denmark	230 M EUR
The Federal Republic of Germany	202,5 M EUR
The Republic of Estonia	4,61 M EUR
The French Republic	147 M EUR
The Italian Republic	110,6 M EUR
Hungary	17,6 M EUR
The Kingdom of Norway	46,07 M EUR
The Republic of Poland	33,2 M EUR
The Kingdom of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

European Spallation Source
~ 1500 M EUR



Astroparticle Physics European Consortium

APPEC and Gravitational Waves





APPEC and Gravitational Waves

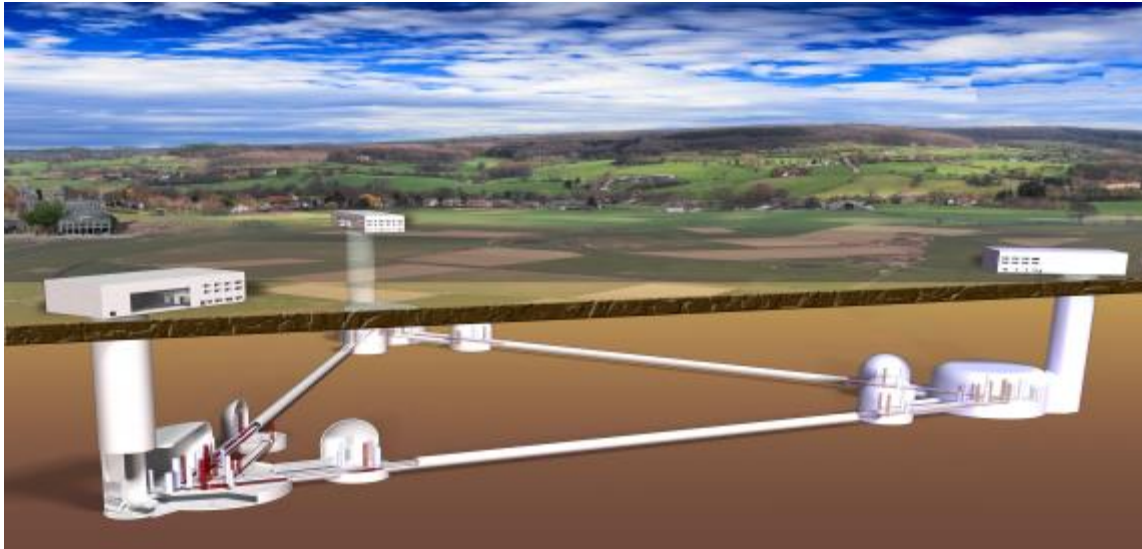


With its global partners and in consultation with the Gravitational Wave International Committee (GWIC), APPEC will define timelines for upgrades of existing as well as next-generation ground-based interferometers.

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

APPEC and Gravitational Waves

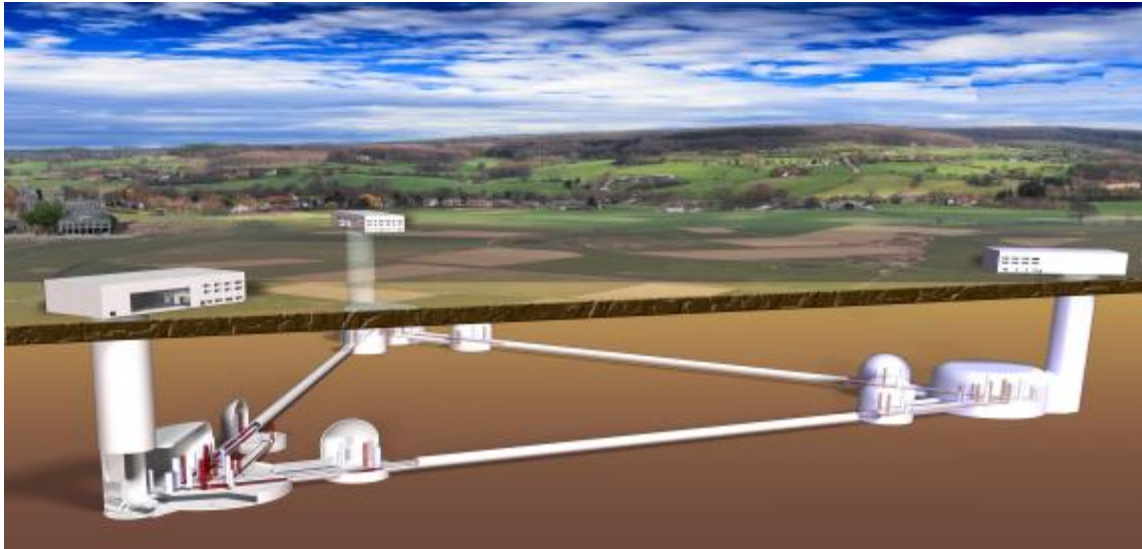
It also strongly supports Europe's next-generation ground-based interferometer, the Einstein Telescope (ET) project, in developing the required technology and acquiring ESFRI status.



APPEC and Gravitational Waves

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



Towards 3rd Generation Detectors: Global level

- Develop Science case: goals and prospects
 - Request to community (GWIC)
 - Review by APPEC (SAC or ad hoc committee)
- Develop Global approach detector (network)
 - How many detectors (in relation to science case)
 - How many concepts?
 - Specifications and R&D challenges
- Develop timelines/roadmap from present towards 3G detectors
- Start with discussions global organisation / governance
 - Involve research organisations/funding agencies in an early stage
- If necessary do some iterations in these steps

Towards 3rd Generation Detector: European level

APPEC endorses Einstein Telescope in Europe:

- Offers to develop a collective European view on the level of research organisations and agencies
- Invites GWIC for a first discussion with GA in December
- Organises common calls for ET R&D
- Organises political support towards ESFRI-proposal in 2019/2021
 - Governance model mature
 - Site selection procedure and at least site candidate(s)
 - Financial support for at least 5 years
- Influences new frame work programme EU (FP9)

Towards 3rd Generation Detector: European level

APPEC endorses Einstein Telescope in Europe and suggests to:

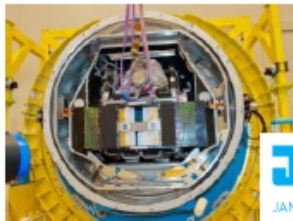
- strengthen the European community with new groups/countries
- develop strategies (on European or global level) on topics like:
 - Open access
 - Open data policies
 - Computing needs (make use of Big Data bubble!)
 - Socio economic impact
 - Spin offs, technology transfer
 - Creating Jobs
 - Impact on region
 - Value of global collaboration
- industry, politics and science are acting in consort

What is the added value of Einstein Telescope?

The arrival of ET stimulates national and regional innovation power, activity, employment and attractivity for top scientists

The facility poses extreme technical demands to equipment, that must be development specially for this application. The involvement and expertise of industry is essential

Measuring and attenuating vibrations: nano-technology, medical, defense

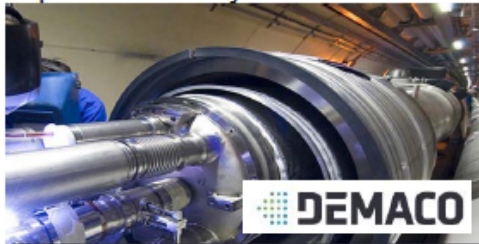


JPE EXPERTS IN POSITIONING
JANSSEN PRECISION ENGINEERING

Optics, coatings, special materials, laser technology, semiconductor technology

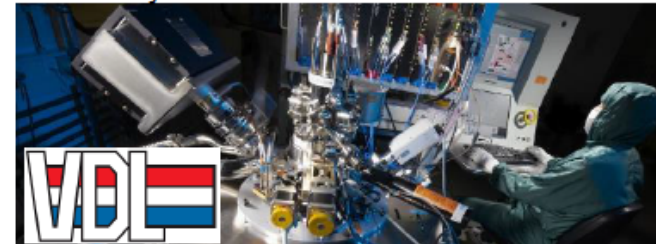


Cryogenic technology: fusion and superconductivity



DEMACO

Vacuum technology: ET will be one of the biggest vacuum systems worldwide



VDL

A few personal remarks

We enter a new era with billion-euro/dollar projects and decisions on governmental level

- Develop a transparent long-term strategy
 - Include LISA
 - Try to have a common global strategy
- Develop realistic time schedules
 - Too optimistic: good for scientists, but risky on the political level
- For Europe: be aware of decision processes of other big science projects (SKA, LHC upgrades, ESRF, etc.)
 - Timing is not only science-driven



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Thank you!

www.appec.org

