



European Astroparticle Physics strategy 2017 - 2026

*Job de Kleuver, APPEC
FCC-week, Amsterdam, 9 April 2018*



Astroparticle Physics European Consortium

CERN

Informal MoU

ESO/ESA



Treaty



APPEC



Treaty



Astroparticle Physics European Consortium

CERN

Science prospects

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



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

2008



2011



2017

Preparations

Considerations

Consultation
community



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APPEC Town Meeting => APPEC Strategy

APPEC Town Meeting



Paris, April 2016

Recommendations and roadmap approved in 2017



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European Astroparticle
Physics Strategy
2017-2026

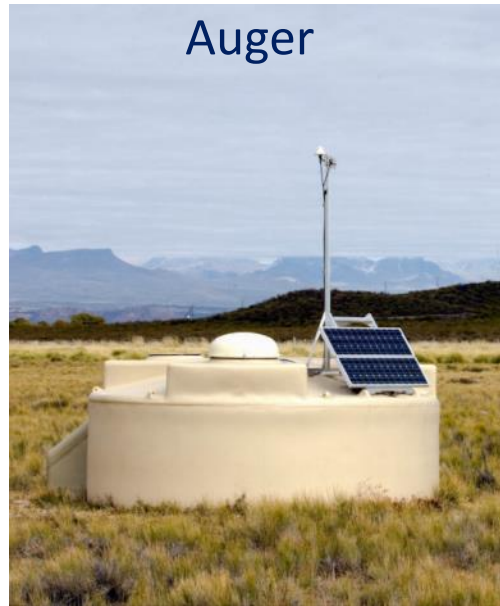
Roadmap 2017 – 2026

21 recommendations





1. High-energy Universe: multi-messengers



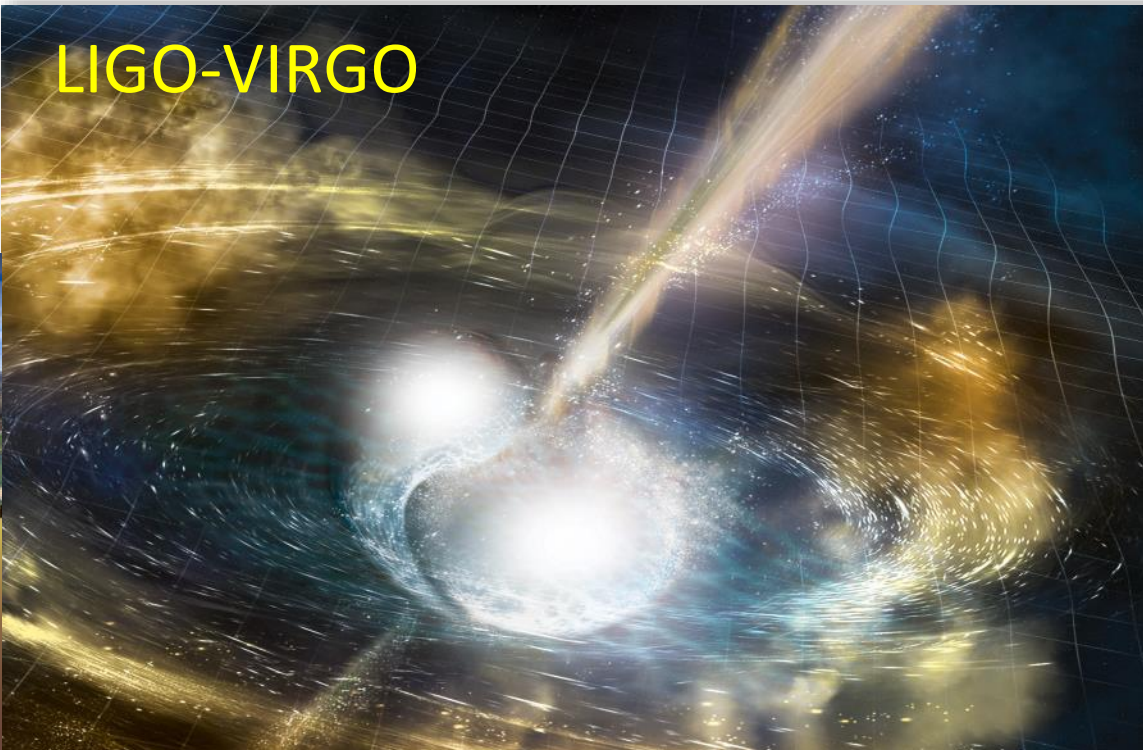
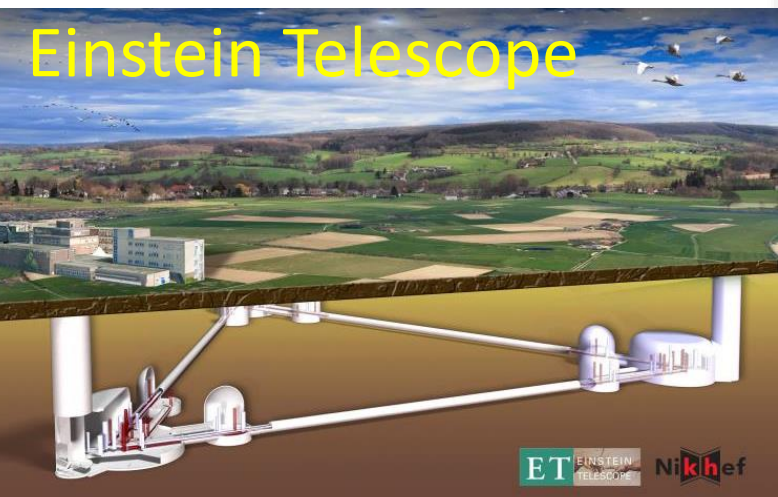


GW170817: start of multi-messenger astronomy:

Gravitational Waves, Gamma- and X-rays, UV, Optical, IR, and Radio Waves, Neutrinos

Wednesday 17.30 talk
Gravitational Waves
Chris v.d. Broeck

Einstein Telescope





Astroparticle Physics European Consortium

30 Million \$

NSF'S 10 BIG IDEAS



In 2016, NSF unveiled a set of "Big Ideas" -- 10 bold, long-term research and process ideas that identify areas for future investment at the frontiers of science and engineering. With its broad portfolio of investments, NSF is uniquely suited to advance this set of cutting-edge research agendas and processes that will require collaborations with industry, private foundations, other agencies, science academies and societies, and universities and the education sector. The Big Ideas represent unique opportunities to position our Nation at the cutting edge -- indeed to define that cutting edge -- of global science and engineering leadership and to invest in basic research and processes that advance the United States' prosperity, security, health and well-being.



Windows on the Universe: The Era of Multi-Messenger Astrophysics

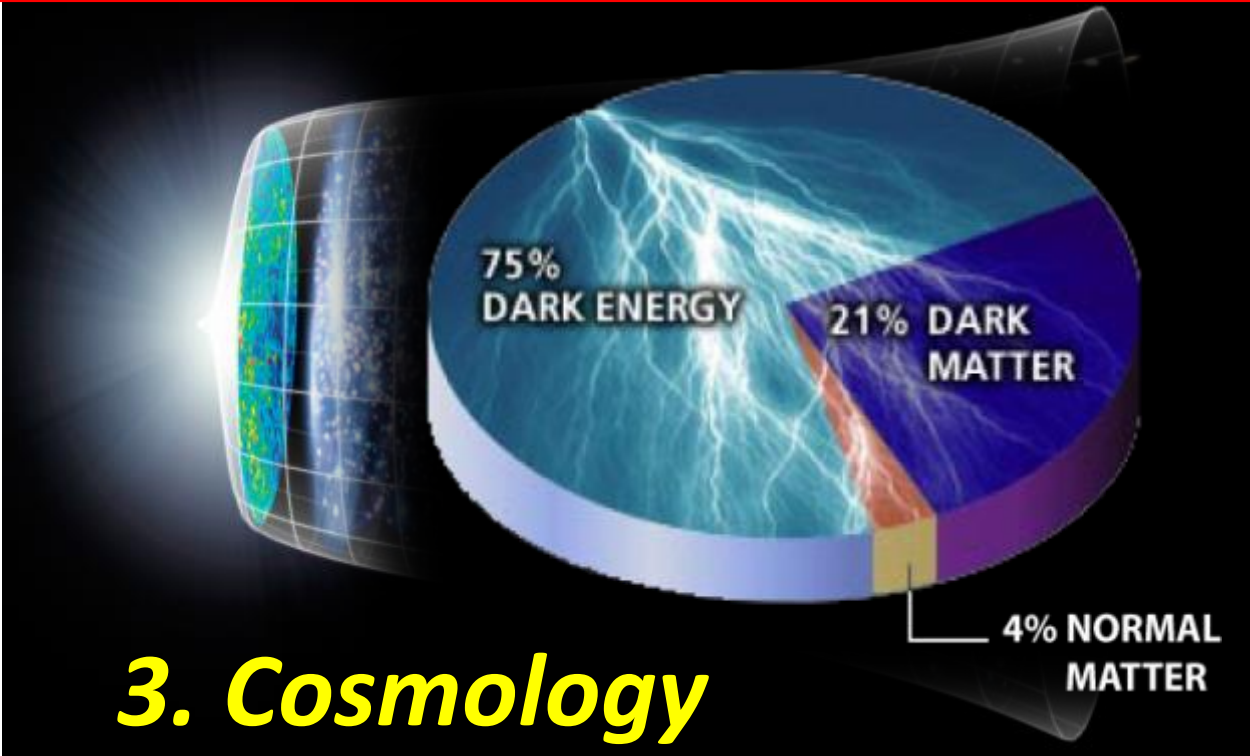
Using powerful new syntheses of observational approaches to provide unique insights into the nature and behavior of matter and energy and help to answer some of the most profound questions before humankind. [Read more.](#)



1. High-energy Universe: multi-messengers



2. Neutrino's





Organisational issues

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

Societal issues

- Gender balance
- Education & Outreach
- Industry



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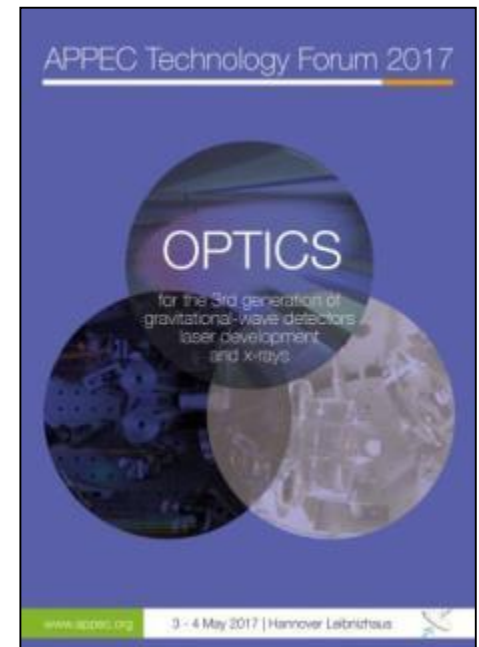
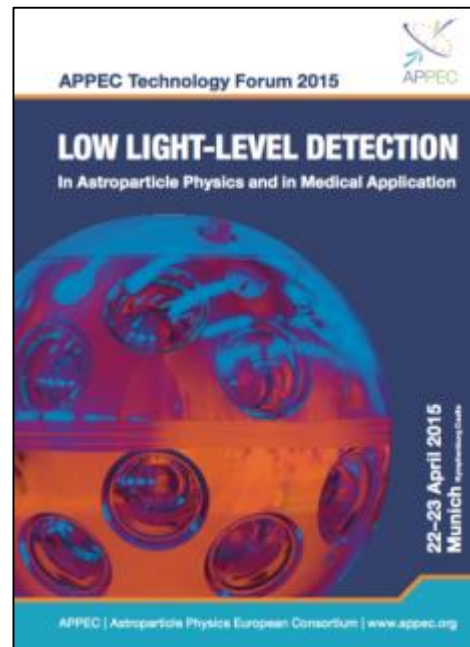


APPEC Technology Forum 2018

12-13 November 2018 Veldhoven

ATF 2018 - Anti-vibration and positioning systems and sensors for high-stability holders

Platform for
discussion and
collaboration
involving industry
and academia



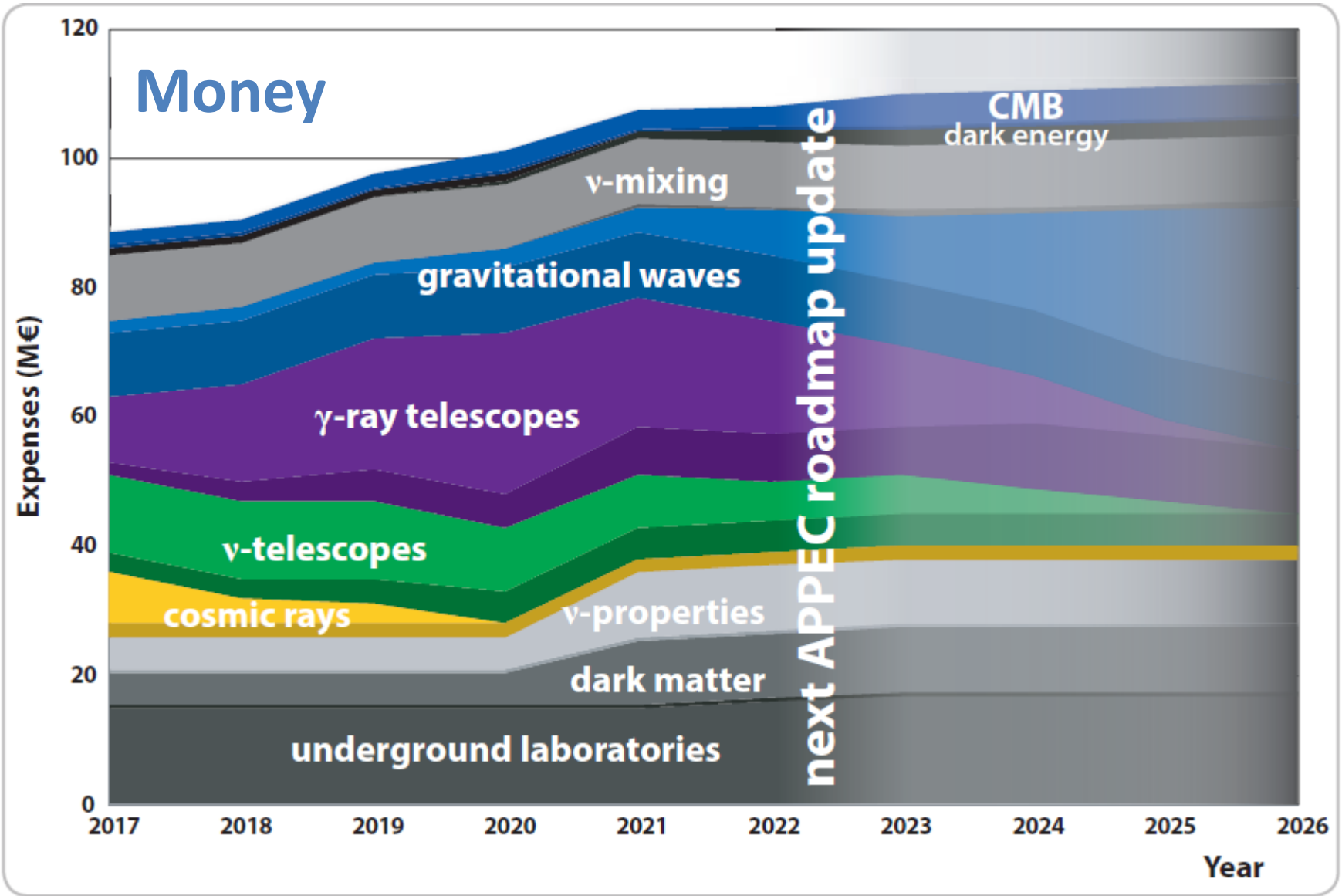


Astroparticle Physics and Particle Physics Ties

- Consistent description of the evolution of the Universe from quantum phase to large scale structures
- Communities intimately related
- Computing and data strategies
- Share expertise in experimental techniques, project management and governance
- APP dominates CERN's 'recognized experiments'
- ECFA/APPEC detector R&D panel
- European Astroparticle Theory Center



Astroparticle Physics European Consortium





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



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Bright side:

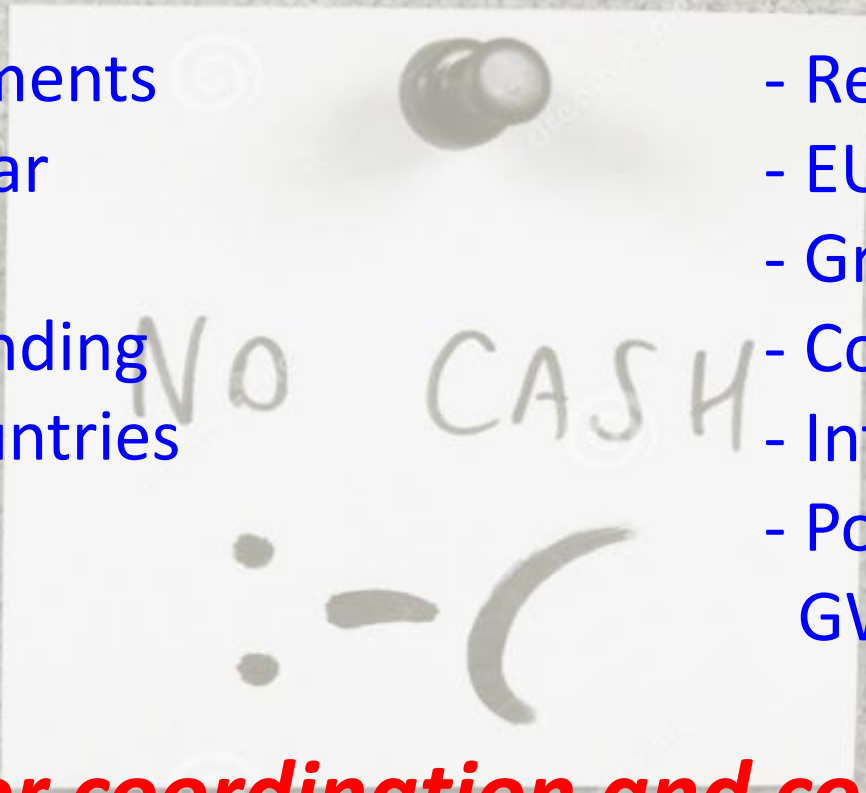
APP investments
~75 M€/year

national funding
partner countries

Opportunities:

- Regional €'s
- EU ERDF
- Growing field
- Collaboration
- Interdisciplinary
- Political interest
- GW

Need for coordination and collaboration



European research infrastructures roadmap: ESFRI



STRATEGY REPORT
ON RESEARCH

CTA

Cherenkov Telescope Array

2023*

297

20

EST

European Solar Telescope

2026*

200

9

KM3NeT 2.0

KM3 Neutrino Telescope 2.0:
Astroparticle & Oscillations Research with Cosmics
in the Abyss

2020*

92

3



ROADMAP 2016

1 ESFRI PROJECTS							
NAME	FULL NAME	START YEAR	OPERATION YEAR	REGISTRATION / ACQUISITION	CONSTRUCTION COST (M)	OPERATIONAL BUDGET (M/YEAR)	
DIRTY	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 World Reactor for High-tech Applications	2010	2024*		NA	100
DIRTY	WindScanner	European WindScanner Facility	2010	2018*		45-60	8
	ACTES	Aeroclis, Clouds and Trace gases Research Infrastructure	2016	2025*		190	50
DIRTY	DAHURIUS-RI	International Centre for Advanced Studies on River-Sea Systems	2016	2022*		222	28
	KM3NeT 2.0	KM3 Neutrino Telescope 2.0: Astroparticle & Oscillations Research with Cosmics in the Abyss	2016	2020*		92	3
DIRTY	ERIC	European Research Infrastructure for Heritage Science	2016	2022*		4	5

*expected

**for controlled access

NA=not available


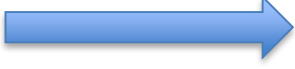

National roadmaps:
APP well represented



Next steps:
funding decisions,
competitions, ...



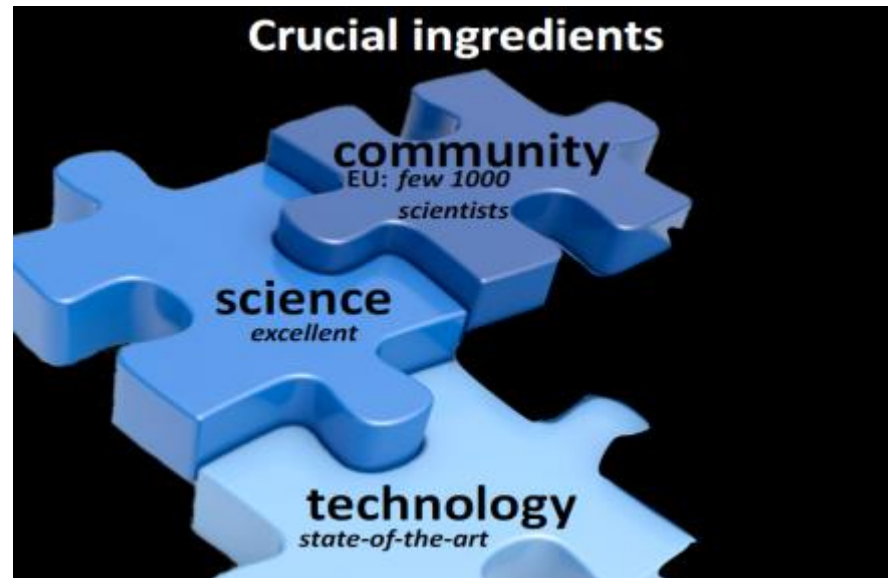
Collecting European Funding

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

Summary:

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





Thank you!

www.appec.org

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