



Astroparticle Physics European Consortium

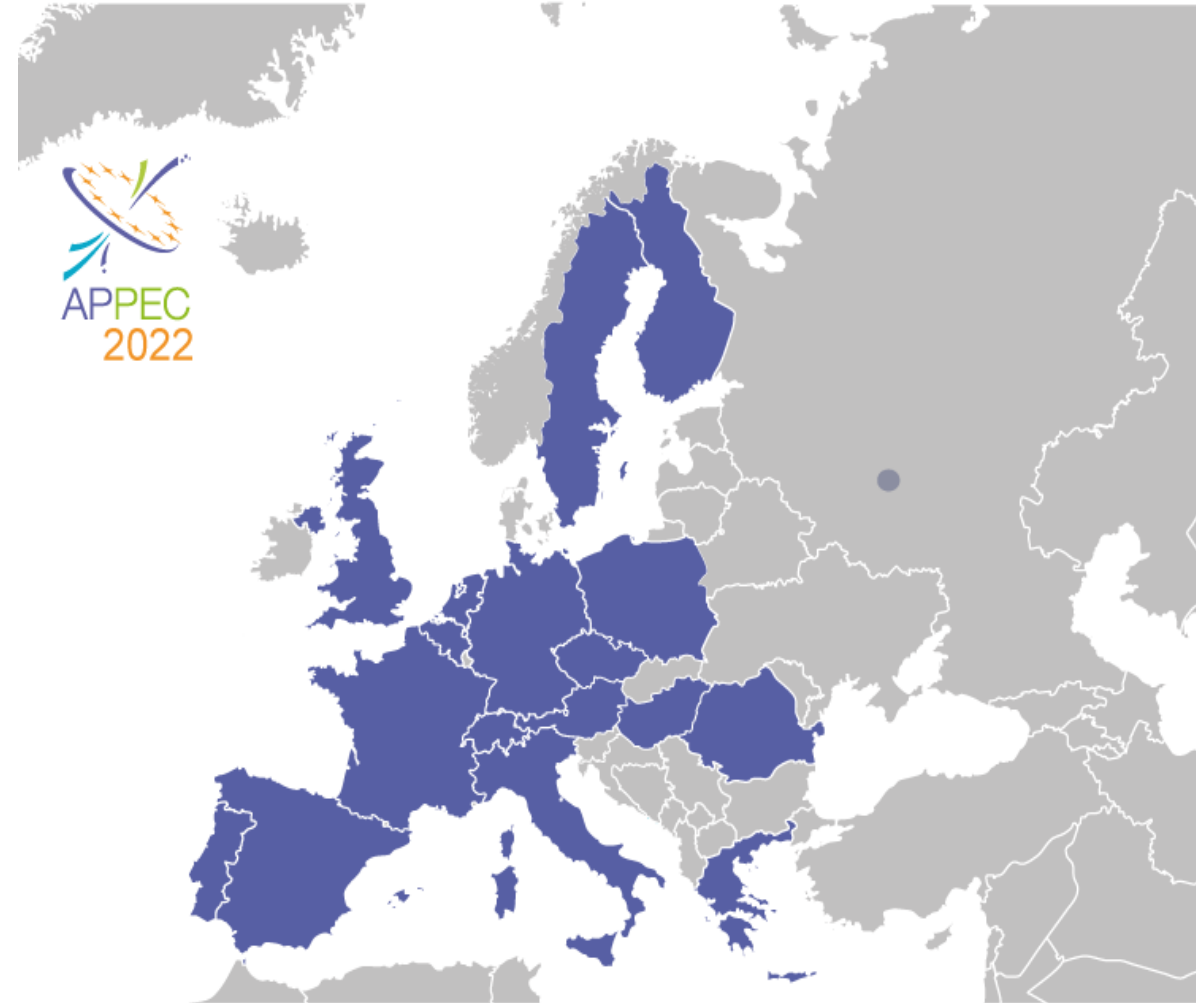
The APPEC Strategy and Roadmap Process

Andreas Haungs | KIT

APPEC Town Meeting | Berlin | 9-10 June 2022



- Is the **A**stro**P**article **P**hysics **E**uropean **C**onsortium
- Acts as an international coordinating structure
- Founded in 2012
- Is based on
 - a Memorandum of Understanding (MoU)
 - a Financial Agreement with DESY (host of the APPEC Common Fund) by all partners
 - 3 bodies (General Assembly; Joint Secretariat; Scientific Advisory Committee)
- APPEC 2022
 - 17 (+1 suspended) member countries, 21 funding agencies, 6 observers
 - 2 candidate members: Denmark, Ukraine
 - a budget of ~70k€/year

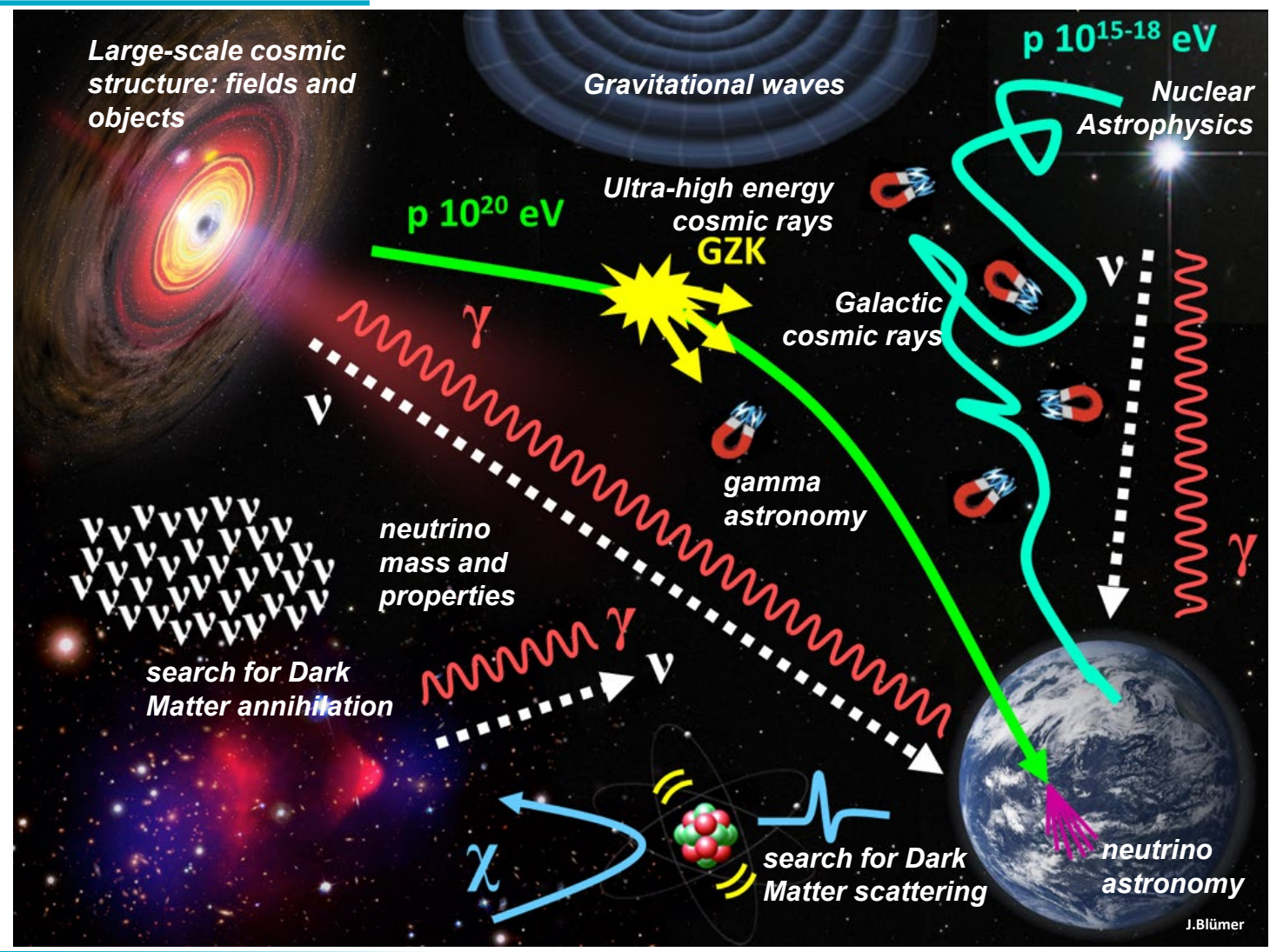


Astroparticle Physics

Understanding the Multi-Messenger and the Dark Universe

Astroparticle Physics is a branch of fundamental science embedded in environment and society!

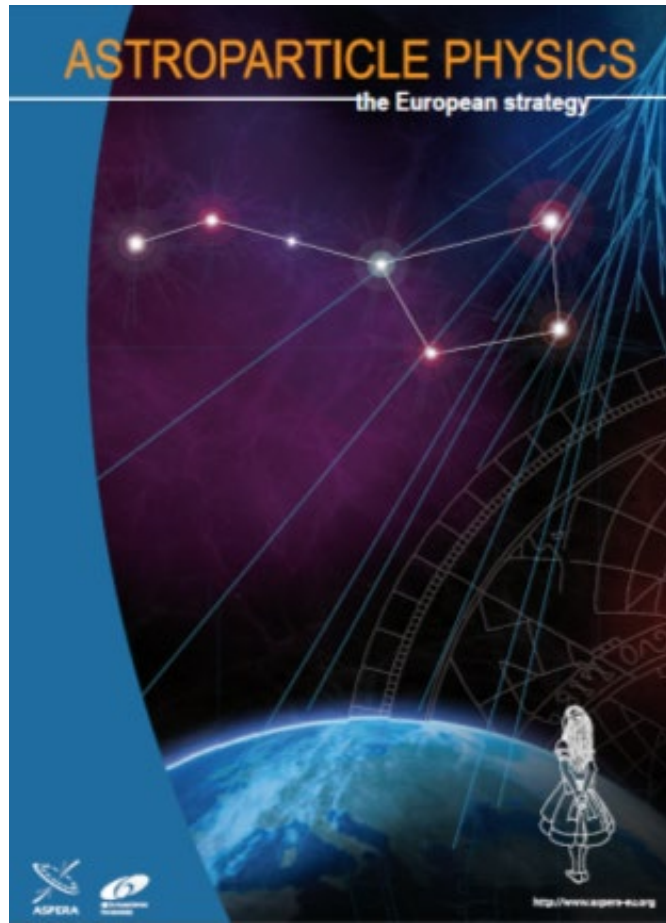
Wikipedia:
 While it may be difficult to decide on a standard 'textbook' description of the field of astroparticle physics, the field can be characterized by the topics of research that are actively being pursued.



APPEC Roadmaps

<https://www.appec.org/roadmap>

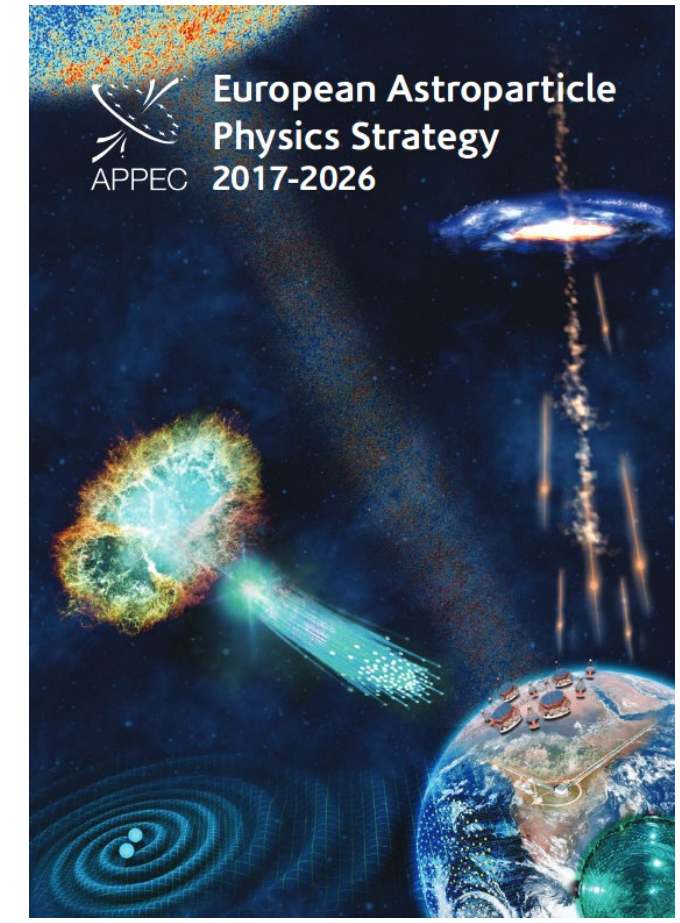
2008



2011



2017



Challenges in Astroparticle Physics

- **The Extreme Universe:**

What can we learn about the cataclysmic events in our Universe by combining all of the messengers?

- **The Dark Universe:**

What is the nature of Dark Matter and Dark Energy?

- **Mysterious neutrinos:**

What are their intricate properties and what can they tell us?

- **The Early Universe:**

What can we learn about the Big Bang, e.g. from the CMB?

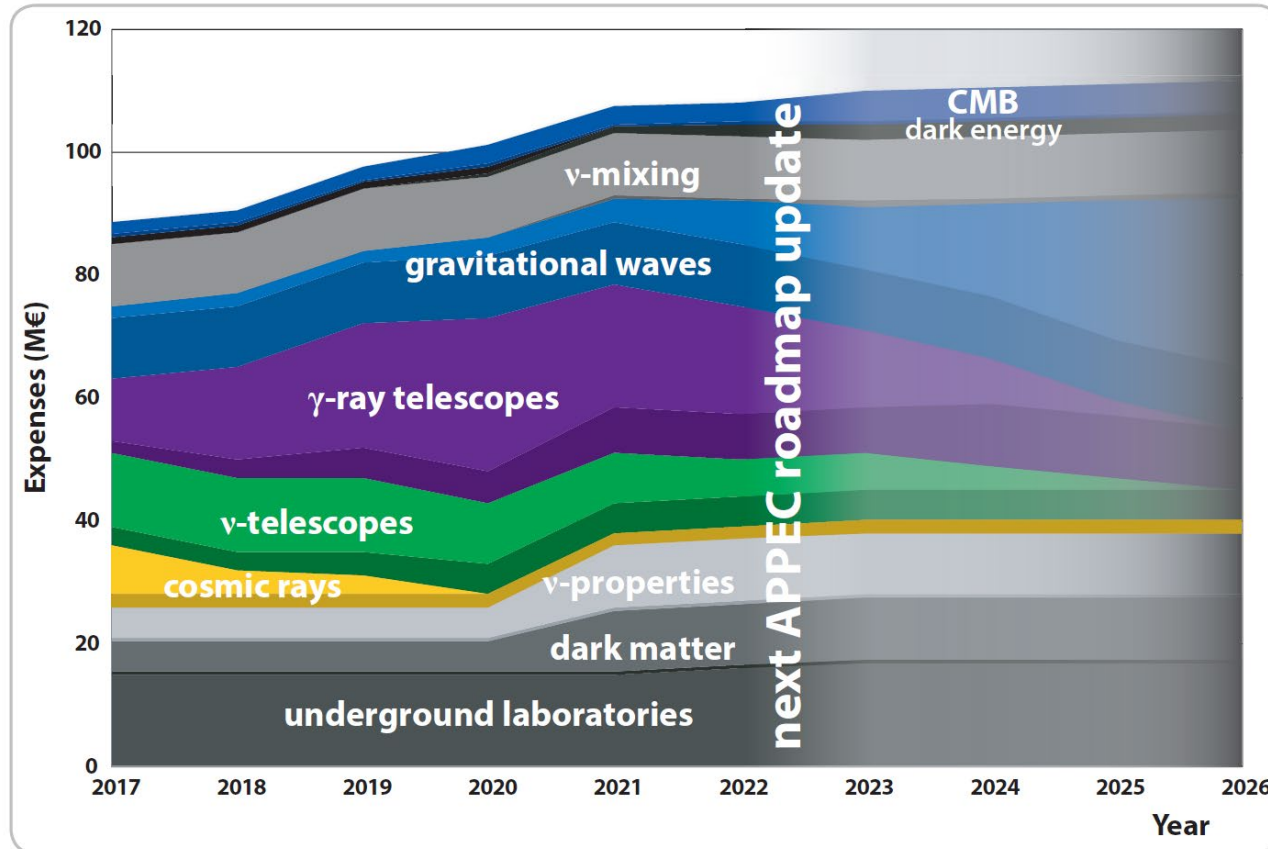
APPEC is...

- Helping in coordination of **large-scale** RI
- Helping in transition of **mid-scale** experiments to large-scale RI
- Helping in support of **small-scale** and R&D experiments
- Coordinating support from EU framework programmes
- Fostering synergies with neighboring fields
- Promotes societal and ecological issues

...to meet these scientific challenges



Midterm Evaluation of the Roadmap



From Roadmap 2017: Projected annual capital investment

- A resource aware roadmap (darker colors also show M&O of RI)
- Midterm Evaluation
 - Preparation of roadmap update
 - Direct Dark Matter working group
 - Double Beta Decay APPEC Sub-Committee
 - European DUL coordination Workshop
 - Multi-Messenger (and real-time) Discussion Workshop
- Goals
 - Identify new developments and new topics
 - Update recommendations
 - Update time and cost line (later the year)
- Town Meeting
 - Provide beforehand information to the communities
 - Feedback Discussions at the Town Meeting

APPEC SAC: Body in Charge



- Sijbrand de Jong (chair) Cosmic Rays
- Silvia Pascoli (vice chair) Neutrino Properties
- Laura Baudis Dark Matter
- Marica Branchesi Gravitational Waves
- Paula Chadwick High Energy Photons
- Karsten Danzmann Gravitational Waves
- Chad Finley UHE Neutrinos
- Ken Ganga Dark Energy
- Maarten de Jong UHE Neutrinos
- Ofer Lahav Dark Energy
- Manfred Lindner Theory
- Sotiris Loucatos Cosmology CMB
- Jocelyn Monroe Dark Matter
- Marco Pallavicini Neutrino Properties
- Sergey Troitsky Theory
- Licia Verde Cosmology CMB
- Christian Weinheimer Neutrino Mass

**Mid-term review of the
European Astroparticle Physics Strategy 2017-2026
in preparation for the 2022 APPEC Town Meeting**

APPEC Scientific Advisory Committee

7 March 2022

Preface:
The European Astroparticle Physics Strategy 2017-2026 was adopted by the Astroparticle Physics European Consortium (APPEC) General Assembly (GA) in 2016. Since then, there have been many developments both in the Astroparticle Physics research field and in the wider world. In the coming time, APPEC undertakes a mid-term update of the European Astroparticle Physics Strategy, with the aim to establish such an update in fall 2022.
The (European) Astroparticle Physics Community will be closely involved in this update. To this end, a Town Meeting is being prepared for 9 and 10 June 2022 in Berlin, at which occasion all relevant aspects of the strategy will be discussed.
This mid-term strategy review document, prepared by the APPEC Scientific Advisory Committee (SAC) serves as input for the discussions themselves. It takes into account the comments provided by the community in a feedback request on a draft document at the end of 2021. On this occasion it is presented to the GA as the final draft for approval to be submitted to the European APPEC community. The input from the Town Meeting will serve as input for the Strategy Update document that the APPEC SAC will prepare for submission to the APPEC GA after the 2022 summer holidays. After approval the GA will release it as the European Astroparticle Physics Strategy 2022-2026 Update. The European Astroparticle Physics Strategy 2022-2026 Update will also serve as an input to the process to establish the new European Astroparticle Physics Strategy after 2026.

Table of Contents:

1. Introduction.....	3
2. High-energy gamma rays.....	6
3. High-energy neutrinos.....	13
4. High-energy cosmic rays.....	17
5. Gravitational waves.....	22
6. Dark Matter.....	31
7. Neutrino properties.....	35
8. Cosmic microwave background.....	45
9. Dark Energy.....	48
10. Multi-probe astroparticle physics.....	51
11. Ecological impact.....	54
12. Societal impact.....	56
13. Open Science and Citizen Science.....	59
14. Human talent management.....	61
15. Inventory of "central" infrastructures.....	63
16. Discussion items for the strategy update.....	65

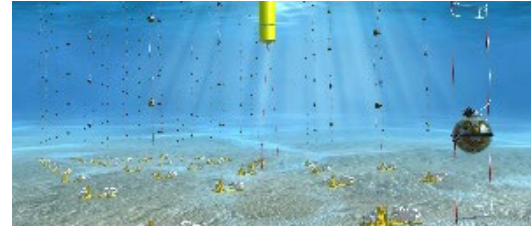
...Feedback expected at this town meeting

...will serve as basis for the coming Roadmap Update

APPEC Future Flagship Research Infrastructures

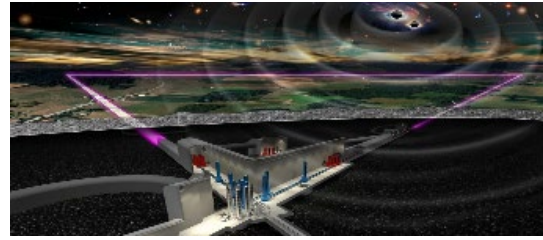
This is not a closed, but dynamic list...

[construction KM3NeT 2020-2026]



ESFRI

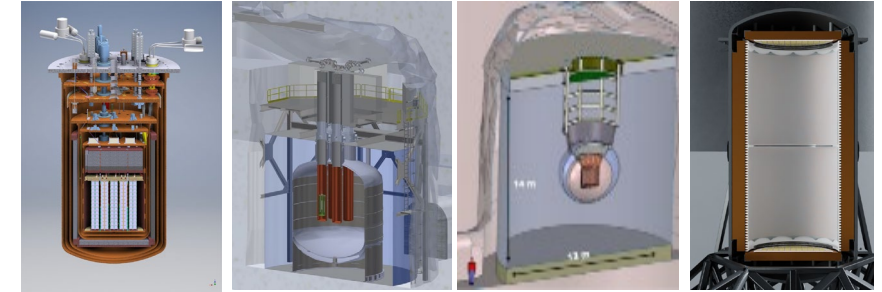
HE Neutrinos



ESFRI

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Gravitational Waves



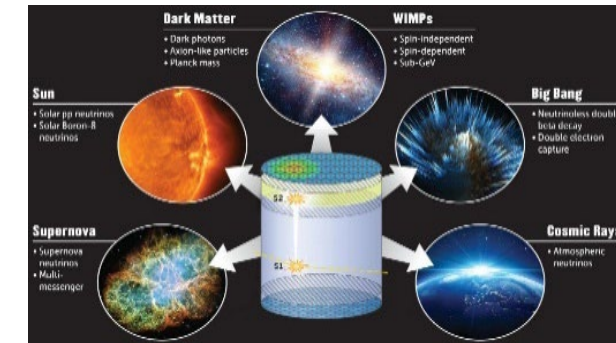
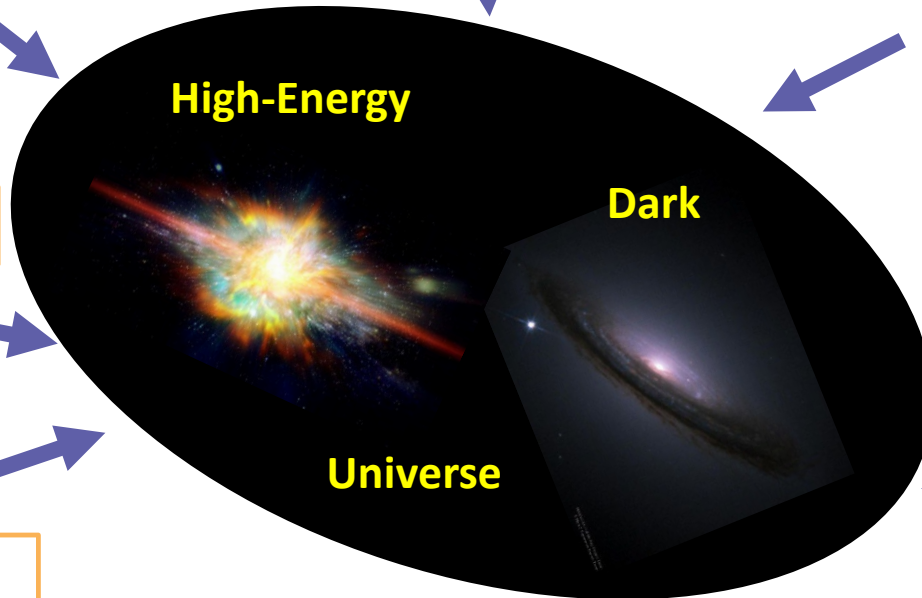
[construction LEGEND-1000, CUPID, nEXO, NEXT, 2023-

Neutrino Properties

[construction AugerPrime 2019-2023]



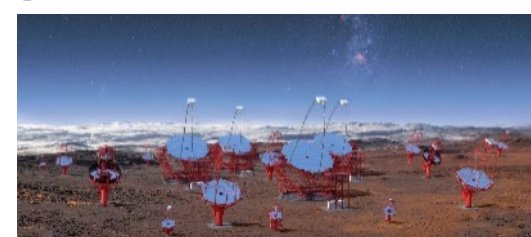
HE Cosmic Rays



[construction DARWIN, ARGO 2024-

Dark Matter

[construction CTA 2021-



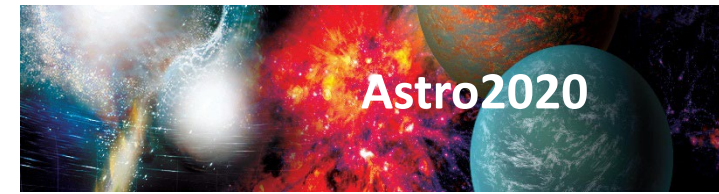
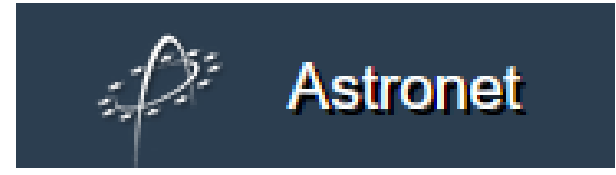
ESFRI

HE Gamma rays

Strategy Connections

In the APPEC strategy process there are strong connections to

- ECFA: EPPSU and corresponding roadmaps (in particular Detector R&D)
- NuPECC: Nuclear Physics Long Range Plans
- Astronet: Integrated Roadmap for European Astronomy
- Snowmass2021
- Decadal Survey on Astronomy and Astrophysics 2020 (Astro2020)
- National communities



Summary

- Astroparticle Physics is a booming and blooming field
- In search of the wonders of the cosmos
- Going to understand the fundamental law of Nature
- Plenty of opportunities for young scientists

Roadmap:

- Town Meeting (midterm evaluation of Roadmap)
- Diverse program with request to realize large infrastructures
- Balanced plans for investments
- General shift in schedule due to slow realizations
- Prize tags needs to be cross-checked / updated
- Societal and environmental impact as well as economic and ecological footprint and sustainability are becoming more and more important
- Publication and implementation of recommendations



APPEC Newsletter:

<https://www.appec.org/latest-news/newsletters>