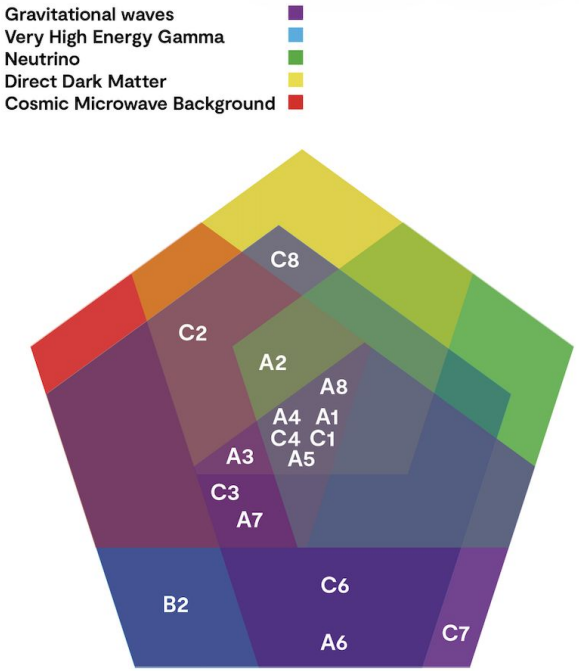
Starting point: the 2022 PAAP roadmap structure



A1	What are the laws of physics operating in the early Universe?
A2	How did the initial structure in the universe form?
A3	How is the universe evolving and what roles do dark matter and dark energy play?
A4	When and how were the first stars, black holes and galaxies born?
A5	How do stars and galaxies evolve?
A6	How Do Nuclear Reactions Power Astrophysical Processes and Create the Chemical Elements?
A7	What is the True Nature of Gravity?
A8	What can gravitational waves and high-energy particles from space tell us about the universe?
B2	What effects do the Sun and other stars have on their local environment?
C1	What are the fundamental particles and fields?
C2	What are the fundamental laws and symmetries of physics?
C3	What is the nature of space-time?
C4	What is the nature of dark matter and dark energy?
C6	What is the nature of nuclear matter?
C7	Are there new phases of strongly interacting matter?
C8	Why is there more matter than antimatter?

+ Are the core subfields still right?
+ Are important interfaces or new subfields missing?
+ Does the mapping to STFC frontier challenges need updating?
+ What has changed since 2022 that STFC must understand?

As a field we have the strongest position to address those challenges!

Link to 20202 roadmap:
Link to pdf

Summary of the roadmap 2022 recommendations

Scientific strategy

- Breadth across astroparticle physics, not a single-project programme.
- R&D diversity, especially beyond large WIMP-scale searches.
- Support for future observatories, not only exploitation of current ones.

UK leadership

- Major international leadership in flagship facilities.
- Timely strategic decisions to avoid losing leadership roles.

Enabling capability

- Theory as essential infrastructure, but structurally under-supported.
- Better routes for interdisciplinary work across astronomy, particle physics, UKSA, QTFP and infrastructure funding.
- Stronger support for instrumentation, ECRs, software, RSEs, technical staff and long-term skills.

Key Questions for the AP community going forward

For each field — and possible new subfields — we need to establish:

1. **What has changed since 2022?**
   Discoveries, construction progress, delays, international strategy, funding landscape.
2. **Where does the UK genuinely lead?**
   Scientific, technical, infrastructure, software, theory or collaboration leadership.
3. **What is fragile?**
   People, theory, instrumentation, facilities, consolidated grants, ECR pipeline, access to international projects.
4. **What requires timely strategic action?**
   Direct detection route; ET/CE; CMB-S4/LiteBIRD; CTA/SWGO; neutrino astronomy; Boulby; QTFP continuation.
5. **What should PAAP say clearly to STFC?**
   Continue, grow, protect, merge, reposition or deprioritise.