Astroparticle Physics European Consortium

EXTRA EDITION - 6 April 2016

APPEC Town meeting – day 1

The APPEC Town Meeting brought 200 registered participants to the Sorbonne University in Paris on 6 April 2016. The goal: to examine the current state of astroparticle physics in Europe and work towards recommendations for a new APPEC roadmap to be published later in the year. The participants were welcomed by former APPEC Chair Stavros Katsanevas, whose dedicated team had made all the necessary preparations for the event.

The scene was set by the chairman of the Scientific Advisory Committee, Antonio Masiero, who said that recent years had seen the triumph of the standard model – as the discovery of the Higgs boson, the Planck map of the cosmic microwave background, and the recent direct detection of gravitational waves had all supported it. However, “new” physics is still needed to explain some of the observed facts. He pointed out that the “Magnificent Seven” of the previous roadmap had now been augmented to nine, as dark energy and the cosmic microwave background must be added to the principal topics of astroparticle physics. The roadmap will focus on: multimessenger astronomy, neutrino properties, and the dark side of the universe and CMB. Prof Masiero also emphasised that this is to be a resource-aware roadmap and that infrastructure of all sorts, including computing, must be factored in. But he said we could look forward to a thrilling decade ahead – where we solve neutrino mysteries, gain new understanding of dark matter, and look at the CMB in the post-Planck era.

The morning session looked at the high energy universe. The first talk concentrated on gamma rays as Felix Aharonian spoke of the developments from observatories so far, and the opportunities ahead with the construction of the Cherenkov Telescope Array (CTA). He highlighted the need for more complementary observations at the lower energy threshold and over larger fields of view. Overall, he looked forward to a very bright future for ground-based gamma ray astronomy. The discussion sparked by his talk delved into complementarity further, as well as the need for international collaboration. Gisela Anton presented the current state of play in neutrino telescopes, as well as conducting a SWOT analysis and looking to the future, and Andreas Haungs followed up with an examination of cosmic ray observation. He explained that the Pierre Auger Observatory has brought about new understandings and can already address key questions in particle physics beyond man-made accelerators, and in proving that proton astronomy will be possible.

Following lively discussions over lunch, the afternoon session began with three detailed discussions: Roger Blandford began the session with, in his words “the whole Universe and how we explore it, in 15 minutes”. He pointed out that some of the major discoveries of recent times were “unscripted” in that they were not made with specific design and infrastructure. He also argued that the most interesting science is now entangled between disciplines and that methodologies in physics and astronomy were beginning to converge.

Subir Sarkar presented current problems in cosmology, bringing with him the previous experience of working on the 2011 Roadmap. He said that evidence for cosmic acceleration was still marginal, and that real-time cosmology would be needed, but was not included in the draft considerations circulated before the meeting. Reflecting on the relationship between the standard model and new observations, he said that testing of the model’s empirical foundations was a priority, but that alternative models should also be considered.

Discussing current problems in neutrino theory, Eligio Lisi said that the three neutrino framework was simple but incomplete. He said there were opportunities for new discoveries and for precision physics. While grassroots co-ordination could be successful at the interfaces of different areas of study, he contended that top-down long-term funding was also needed both in the “soft” domain of scholarships and travel grants, and “hard” domain (office space, staff, infrastructure etc.).

Mauro Mezzetto presented on neutrino parameters with large experiments, and extra time was devoted to the discussion of the draft considerations circulated in advance of the meeting. While the draft considerations were not hierarchical, it was decided that some belonged to a separate chapter. The members of the General Assembly, as editors of the Roadmap, were also urged to consider the

different national programmes in place before recommending European collaborative action.

The final talk of the afternoon session was given by Jocelyn Monroe on the topic of dark matter. She drew on the results of a 2014 survey by APPEC saying that dark matter accounted for a greater percentage of scientists in Europe than it did percentage of funding. She also pointed out that dark matter experiments were not as expensive as those in some other astroparticle physics areas. A range of other issues relating to the draft considerations including the role of R&D were discussed. The meeting adjourned before a well-attended public lecture by Takaaki Kajita, Nobel Laureate 2015, which was also made available in French.

See the Storify report of social media interactions during the meeting here.

Reminder: You can read the draft considerations being discussed at the meeting here

This summary is by the APPEC Communications and Outreach Coordinator, Ruth McAvinia. A full record of the Town Meeting is being made to support the writing and editing of the 2016 Roadmap.