

# Report of OECD Working Group on Astroparticle physics and Implications for IUPAP

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# OECD Working Group on Astroparticle physics

- Formed in October 2008. Report 31 March 2011
  - Chair Michel Spiro, IN2P3
  - Report at <http://www.oecd.org/dataoecd/24/55/47598026.pdf>
- “Astroparticle physics is the study of particles and radiation from outer space, and of rare cosmologically-significant elementary particle reactions. The scales of distance examined range from the realm of elementary particles to the outer reaches of the observable universe, placing the field at the intersection of cosmology, astrophysics, particle physics and nuclear physics”

# Strategic Vision

- Dark Matter
- Dark Energy
- High-energy cosmic messengers
- Gravitational waves
- Extending the Standard Model
  - Neutrino properties  
They noted strong overlap with Nuclear Physics and that double beta decay is considered part of nuclear physics in some countries.
  - Proton decay

# What they did not do

- Could have included lots of other areas where nuclear physics has intense interests
  - Big bang nucleosynthesis
  - Chemical evolution of the universe
  - Mechanisms of supernova explosions
    - Calibrations of standard candles
    - Neutrino observatories are partially included
  - Physics of stars

# Conclusions

The astroparticle physics community, despite its relatively short history, has achieved good levels of international coordination. Regional and thematic roadmaps have been formulated. One important large infrastructure (the gravitational wave experiments) operates as a worldwide network. Some experiments are global-scale endeavours (e.g., the Auger Observatory). Nevertheless, the scale of the next generation of large infrastructures will require enhanced forms of international coordination. The high diversity of promising experimental methodologies implies that no single, universal degree of coordination will be appropriate across the entire field of astroparticle physics. In some areas (e.g., dark matter, or neutrino mass searches) a healthy diversity and competitiveness is desirable for the instruments under construction, even while procurement of rare materials needs to be coordinated, and convergence should be encouraged for future very large third-generation experiments. In other areas (high-energy gamma rays, charged cosmic rays, or high-energy neutrinos) the small number of existing observatories worldwide already operate (or intend to operate) as single integrated worldwide networks. In these areas, the planning of future projects should include consideration of enabling policy issues such as governance, site selection, access to the experimental resources and to data, and operating costs. Lastly, there are very large-scale projects (e.g., dark energy observatories, third-generation gravitational wave experiments and “megaton”-scale proton decay and neutrino detectors) whose cost, complexity and multiple links to neighbouring scientific disciplines (astrophysics, cosmology, particle physics) present a strong case for worldwide convergence or, at a minimum, for avoidance of unnecessary duplication.

# Policy Recommendation

The establishment of a venue for consultations among officials of funding agencies that make significant investments in the field.

Astroparticle Physics International Forum, a subsidiary body of the OECD Global Science Forum.



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## **The Astroparticle Physics International Forum (APIF)**

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### **The Astroparticle Physics International Forum of the OECD Global Science Forum**

The OECD Astroparticle Physics International Forum (APIF) brings together officials and representatives of funding agencies of countries that make significant investments in astroparticle physics research. It is a venue for information exchange, analysis, and coordination, with special emphasis on strengthening international cooperation, especially for large programmes and infrastructures. APIF members can address issues that are the special responsibility of funding agencies, for example, legal, administrative and managerial arrangements for international projects. They may also consider matters such as access to experimental facilities and data, procurement of essential materials, and optimal use of resources on a global scale. APIF is not a venue for discussing purely scientific matters, and it does not duplicate or replace established national and international processes for planning, prioritisation, funding, assessment or implementation of specific projects or programmes.

Membership from Argentina, Belgium, Canada, China, France, Germany, India, Israel, Italy, Japan, Netherlands, Sweden, Switzerland, United Kingdom, United States

Chaired by Michael Turner

# Policy Recommendation

The Working Group also recommends that the scientific community strengthen its activities aimed at ensuring vigorous, globally coherent progress in astroparticle physics. Specifically, the International Union of Pure and Applied Physics (IUPAP) could review and, if appropriate, adjust its mechanisms for promoting international scientific co-operation and discussions among scientists about the future of the field. The latter activities could include maintaining and elaborating the strategic vision described in this report. Under the aegis of IUPAP, data-gathering, analysis, and structured deliberations could produce information and advice for policymakers. The community-based consultations would need to be characterized by openness and inclusiveness, involving scientists from all of the relevant scientific disciplines, with representation from major geographic regions, and with transparent procedures for the selection of participants in the activities.

Letter to IUPAP President containing this request.

# IUPAP Response

A perception that PANAGIC is dysfunctional – members do not attend meetings

Small working group led by Macolm MacCallum to bring proposal to restructure

- 1) Disband PANAGIC
- 2) Form new working group Astroparticle Physics International Committee
- 3) Elevate Gravity Waves International Committee to an IUPAP working group.

# What should we do?

- Encourage APPIC to include Nuclear Astrophysics
- Make sure we have some representation at APPIC
- Communication from WG-9 and C-12