

Snowmass2021 LoI: *IUPAP Neutrino Panel Report*

Neutrino Frontier Topical Groups:

- (NF1) Neutrino oscillations
- (NF2) Sterile neutrinos
- (NF3) Beyond the Standard Model
- (NF4) Neutrinos from natural sources
- (NF5) Neutrino properties
- (NF6) Neutrino cross sections
- (NF7) Applications
- (NF9) Artificial neutrino sources
- (NF10) Neutrino detectors

Cosmic Frontier Topical Groups:

- (CF7) Cosmic Probes of Fundamental Physics

Theory Frontier Topical Groups:

- (TF09) Astro-particle physics & cosmology
- (TF11) Theory of neutrino physics

Accelerator Frontier Topical Groups:

- (AF02) Accelerators for Neutrinos

Underground Facilities Topical Groups:

- (UF1) Underground Facilities for Neutrinos
- (UF3) Underground Detectors
- (UF4) Supporting Capabilities
- (UF6) An Integrated Strategy for Underground Facilities and Infrastructure

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Abstract: (maximum 200 words)

The International Union of Pure and Applied Physics has convened an international panel to promote international collaboration in the development of future neutrino programmes to establish the properties of neutrinos and the physics of neutrino sources. The IUPAP Neutrino Panel is constructing a 'white paper' following international community consultation, using a working group structure covering all aspects of neutrino science and infrastructure. This white paper may be a useful input for the Snowmass Frontier working groups.

The IUPAP Neutrino Panel: Mandate and Output

At its 29th General Assembly on 11-13th October 2017 in Sao Paulo, Brazil, the International Union of Pure and Applied Physics (IUPAP) passed a resolution requesting the formation of a Neutrino Panel to promote international collaboration in the development of future neutrino experiments to establish the properties of neutrinos. This resolution was put forwards by the leads of several Commissions and Working Groups (Alinka Lepine-Szily, Karl-Heinz Kampert, Michel Spiro, Joachim Mnich, Juan Fuster).

The 29th General Assembly resolved to establish the Neutrino Panel as a combined effort under the supervision of the C4, C11 and C12 Commissions together with the WG1, WG9 and WG10 Working Groups. The C11 Commission has taken the role as the coordinating Commission of the action. Heidi Schellman, Chair IUPAP Commission C11, is a member of the Neutrino Panel and coordinates with the Executive Council of IUPAP. The IUPAP Executive Council approved the membership of the Panel at its meeting in November 2018, with the IUPAP Neutrino Panel Terms of Reference approved by the IUPAP Vice-Chair in April 2019. These terms of reference are provided below.

The IUPAP Neutrino Panel is constructing a 'white paper' for presentation to the IUPAP General Assembly in October, 2021. This timeline has been delayed due to the current coronavirus pandemic, although an interim report and first draft of the white paper will be presented to the Council in October 2020. The white paper will be publicly available to the conveners of the various Snowmass Frontiers and Topical Groups during their deliberations.

The white paper is a science-based survey of the current state of the international neutrino field, with analyses of the various future options within the field, the science potential, and infrastructure and technological requirements. As an international overview and with a focus on the potential science output and benefit, there is no constraint being applied to anticipated funding or community. The intent is to highlight potential areas of international cooperation and coordination, to address the challenging questions in contemporary neutrino studies. The IUPAP Neutrino Panel operates under a Working Group structure to connect with the broader community, with the working groups defined as:

- Working Group 1: Neutrino oscillation studies
- Working Group 2: Neutrino absolute mass measurements
- Working Group 3: Interactions, new neutrinos states and neutrinos as probes of fundamental physics
- Working Group 4: Physics of neutrino sources
- Working Group 5: New technologies, cross-over to other science, and frameworks for neutrino physics

A public web page has been secured for eventual dissemination of the final white paper, which is in early stages of construction. This web page is at www.IUPAPNeutrinoPanel.org

Neutrino Panel members and white paper authors -

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IUPAP Neutrino Panel: Terms of Reference

Preamble

1. IUPAP has established the Neutrino Panel with the mandate [1]: ‘to promote international cooperation in the development of an experimental program to study the properties of neutrinos and to promote international collaboration in the development of future neutrino experiments to establish the properties of neutrinos.’
2. The Panel reports to IUPAP General Assembly, an international organization for discussion of the international aspects of pure and applied physics. The C11 Commission of IUPAP will take the role as the coordinating Commission of the Neutrino Panel. [2].
3. The Panel has prepared these Terms of Reference to define its principal objectives and modus operandi.

Objectives

4. Through consultation with the broad neutrino-physics community, funding agency and laboratory management and other stakeholders, the Panel will carry out a review of: (a) The present status of the global neutrino physics programme and the development that can be expected on a 5 to 10-year timescale through a science driven white paper; (b) The measurements and R&D (including software development) that are required for the near-term (<10-year) and medium- to long-term (10 – 25-year) programmes to fulfil their potential.
5. The Panel will identify opportunities within neutrino physics, mutual benefits of global connections within neutrino physics and other fields, as well as the synergies of an international programme.
6. The Panel will provide written updates to the C11 Commission at key milestones in its programme and a final report to the IUPAP General Council by October 2021.

Modus operandi

7. The Panel will meet as required by teleconference and exploit the various international workshops and conferences, on a “best-efforts basis”, to meet face-to-face at least once per year.
8. The Panel will be divided into smaller working groups based on a matrix subdivided into experiments, neutrino sources, and the resulting physics. The working groups will engage the stakeholders via email, and conferences to solicit and collate information from the community on the current and future direction of the neutrino physics programme. The Panel will consolidate the information gathered into text for the white paper, as well as a web-based database.
9. The working groups may organise talks or “mini-workshops” in tandem with topical conferences in each region to communicate that the existence of the Panel, to collect input from the community, and to receive reports from the regional planning activities.
10. The panel will continue its community and stakeholder consultation while preparing its final report. The contents of the report will be circulated and mini-workshops will be organised to present the draft findings and to solicit input from the communities and stakeholders.

References:

1. The International Union of Pure and Applied Physics, Resolutions of the 29th General Assembly:
<http://iupap.org/general-assembly/29th-general-assembly/>
- 2 IUPAP Commission 11: Particles and Fields: <http://iupap.org/commissions/c11-particles-and-fields/>.