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# Update on the IUPAP Neutrino Panel

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Co-Chair, IUPAP Neutrino Panel





**International Union of Pure and Applied Physics**

## **ABOUT US**

### **The Role that IUPAP Plays**

The International Union of Pure and Applied Physics (IUPAP) was established in 1922 in Brussels with 13 Member countries and the first General Assembly was held in 1923 in Paris.

### **The aims of the Union are:**

- to stimulate and promote international cooperation in physics;
- to sponsor suitable international meetings and to assist organizing committees;
- to foster the preparation and the publication of abstracts of papers and tables of physical constants;
- to promote international agreements on other use of symbols, units, nomenclature and standards;
- to foster free circulation of scientists; to encourage research and education.

The Union is governed by its General Assembly which meets every three years. The Council is its top executive body, supervising the activities of the nineteen specialized [International Commissions](#) and four [Affiliated Commissions](#).

# Neutrino Panel History

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In its 29th General Assembly on 11-13 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:

## **Resolution 7: Neutrino Physics Panel**

Council was pleased to endorse the initiative to create a 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 will take the role as the coordinating Commission of the action.

**The 29th General Assembly RESOLVED to establish the Neutrino Panel, composed of nominees of C4, C11, C12, WG1, WG9 and WG10, under the supervision of those Commissions and Working Groups and coordinated by C11.**

**The 29th General Assembly DELEGATED to the Executive Council the authority to approve the mission of the Neutrino Panel and the membership of the Panel.**

Heidi Schellman, Chair IUPAP Commission C11, is a member of the Neutrino Panel and will coordinate with the Executive Council of IUPAP.

# Neutrino Panel Membership

The IUPAP Executive Council approved the membership of the Panel at its meeting in November 2018.

The IUPAP Neutrino Panel Terms of Reference was approved by the IUPAP Vice-Chair in April 2019.

M. Sajjad Athar	AMU, Aligarh, India
Steve Barwick	UCI Physics and Astronomy
Thomas Brunner	McGill University /TRIUMF
Jun Cao	IHEP, Beijing
Mikhail Danilov	Lebedev Physical Inst., Russian Acad. of Sci.
Renata Zukanovich Funchal	University of São Paulo
Kunio Inoue	Tohoku University
Takaaki Kajita (+)	University of Tokyo
Marek Kowalski	DESY
Manfred Lindner (+)	Max Planck Institute for Nuclear Phys.
Ken Long	Imperial College, London /STFC
Nathalie Palanque-Delabrouille	CEA
Heidi Schellman	Oregon State University
Kate Scholberg	Duke University
Seon-Hee Seo	IBS, Center for Underground Physics
Nigel Smith (+)	SNOLAB
Walter Winter	DESY-Zeuthen
Sam Zeller	Fermilab

(+) Co-chairs

# IUPAP Neutrino Panel Mandate

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## 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.

# IUPAP Neutrino Panel Mandate

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## 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 Assembly by October 2020.

# IUPAP Neutrino Panel Mandate

## **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.

# Working Group structure

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## 1. WG1: Three neutrino Oscillation studies

1.1.  $\Delta m^2$ ;  $\theta_{ij}$ ,  $\Delta CP$ , ...

## 2.WG2: Three neutrino absolute mass

2.1.  $M_1$ , double beta decay, ...

## 3.WG3: Interactions, new neutrinos states and neutrinos as probes of fundamental physics

3.1. Sterile neutrinos, coherent scattering, cross sections, NSI, MSW, GeV, Weinberg angle,...

## 4.WG4: Physics of neutrino sources

4.1. Cosmological (BB, GZK, ...)

4.2. Astronomical (SN, AGN and others)

4.3. Solar

4.4. Atmospheric

4.5. Terrestrial

4.6. Reactors

4.7. Beams

4.8. Radioactive decays

## 5.WG5: New technologies and frameworks for neutrinos physics

5.1. Experimental and theoretical underpinning, future technologies and beams, ...

- Limit workgroups to less than six
- Theory threaded throughout, rather than a specific workgroup
- Panel members generally allocated to two work groups - primary/secondary?
- Intention to have work groups that are physics based, and generic enough to allow breadth of scope, but expect areas of cross over
- Matrix other aspects into the working groups

# Working Group members

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## WG Leads

- o WG1: Ken Long and Jun Cao
- o WG2: Thomas Brunner and Walter Winter
- o WG3: Sam Zeller and Mohammad Sajjad Athar
- o WG4: Seon-Hee Seo and Marek Kowalski
- o WG5: There is no WG5 lead. The Panel will collect topics and discuss, then assign who will write contributions.

Member	WG1: osc.	WG2: mass	WG3: probe	WG4: source	WG5: tech
M. Sajjad Athar	✓		✓		✓
Steve Barwick			✓	✓	✓
Thomas Brunner		✓			✓
Jun Cao	✓			✓	✓
Mikhail Danilov		✓	✓		✓
Renata Zukanovich Funchal	✓		✓		✓
Kunio Inoue		✓			✓
Takaaki Kajita (co-chair)					✓
Marek Kowalski	✓			✓	✓
Manfred Lindner (co-chair)					✓
Kenneth Long	✓		✓		✓
Nathalie Palanque-Delabrouille		✓		✓	✓
Heidi Schellman			✓		✓
Kate Scholberg			✓	✓	✓
Seon-Hee Seo	✓		✓	✓	✓
Nigel Smith (co-chair)					✓
Walter Winter		✓		✓	✓
Sam Zeller	✓		✓		✓

# Where are we now?

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- Monthly teleconferences to update Panel members on progress
- Working groups convened
  - Leads of working groups defined topics to cover, ensuring overlaps understood
- Working Groups now beginning to connect to community
  - Aim is for a dialogue, with members of WG and leads
  - Publicising panel and membership at summer conferences
- White paper framework under construction
- Public web page secured for communications
  - ([www.IUPAPNeutrinoPanel.org](http://www.IUPAPNeutrinoPanel.org)) very early stages of construction