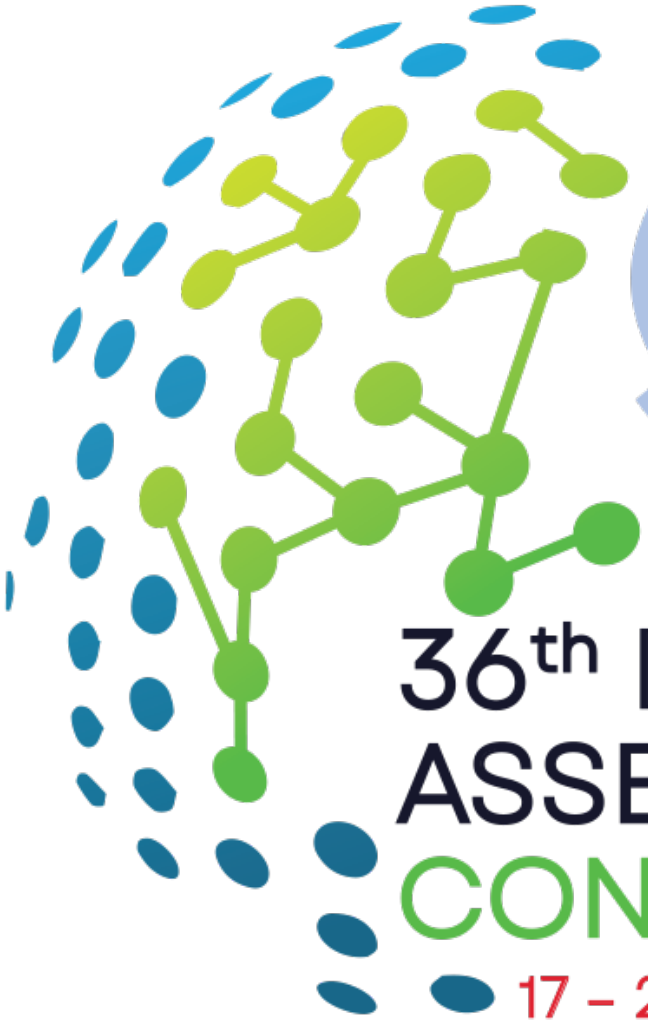


IUPAP

36th IUPAP GENERAL ASSEMBLY & INTERNATIONAL CONFERENCE ON PHYSICS 2027

17 – 23 October 2027 | Indaba Hotel, Johannesburg, South Africa

Igle Gledhill, IOC Chair

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SOUTH AFRICAN INSTITUTE OF PHYSICS

SAPhysNet
Southern Africa Physics Network



science, technology & innovation
Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA

NRF National Research Foundation

alc african laser centre

CSIR Touching lives through innovation

THE EARTH-HUMANITY COALITION

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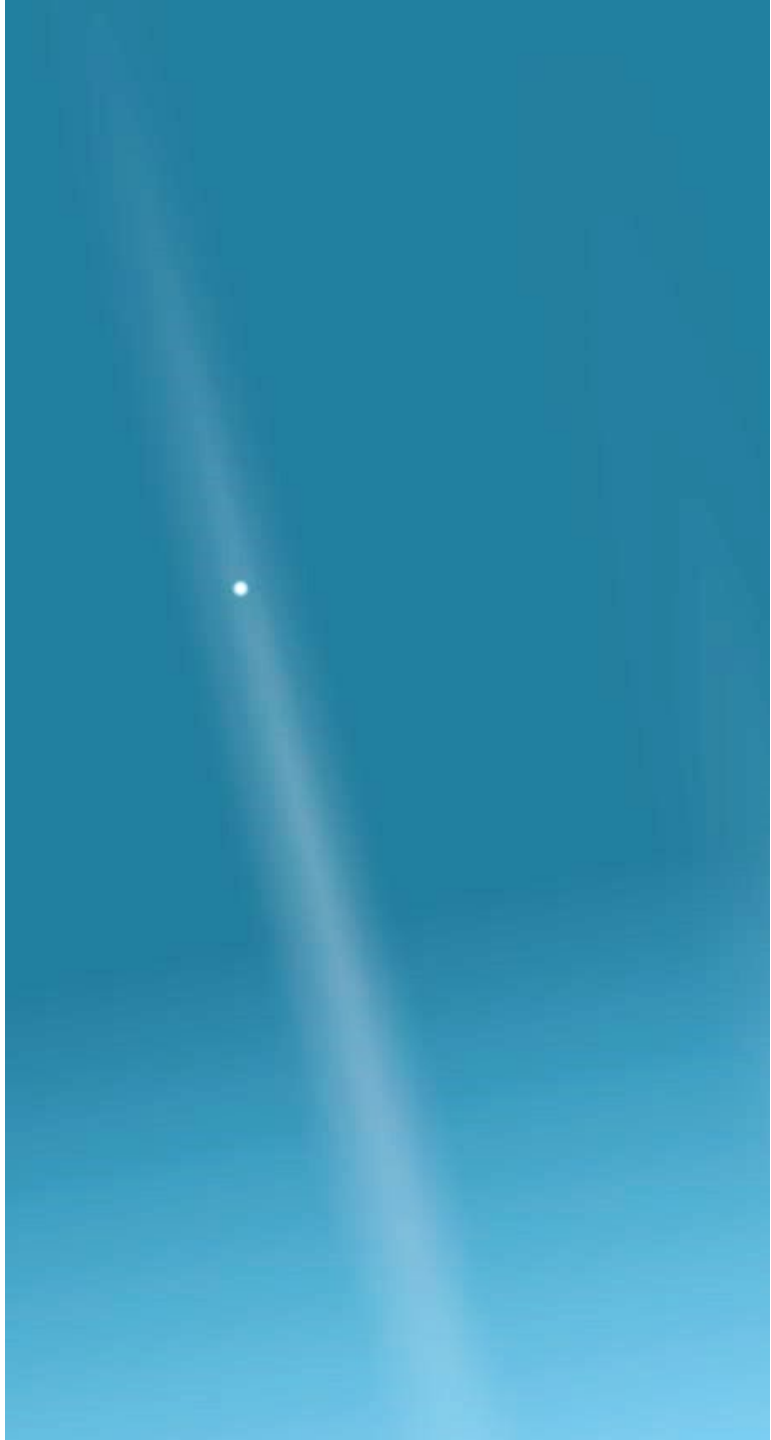
GAUTENG it starts here

South Africa Inspiring new ways

Two Concepts combine

- International Conference on Physics
  - Topics of interest across the physics community

- WG21 task 6: a major conference
  - As **sustainable** as possible; low carbon footprint, therefore **hybrid**,
  - As **inclusive** as possible: therefore in-person Travel Grants, virtual Tech Grants, primarily developing countries

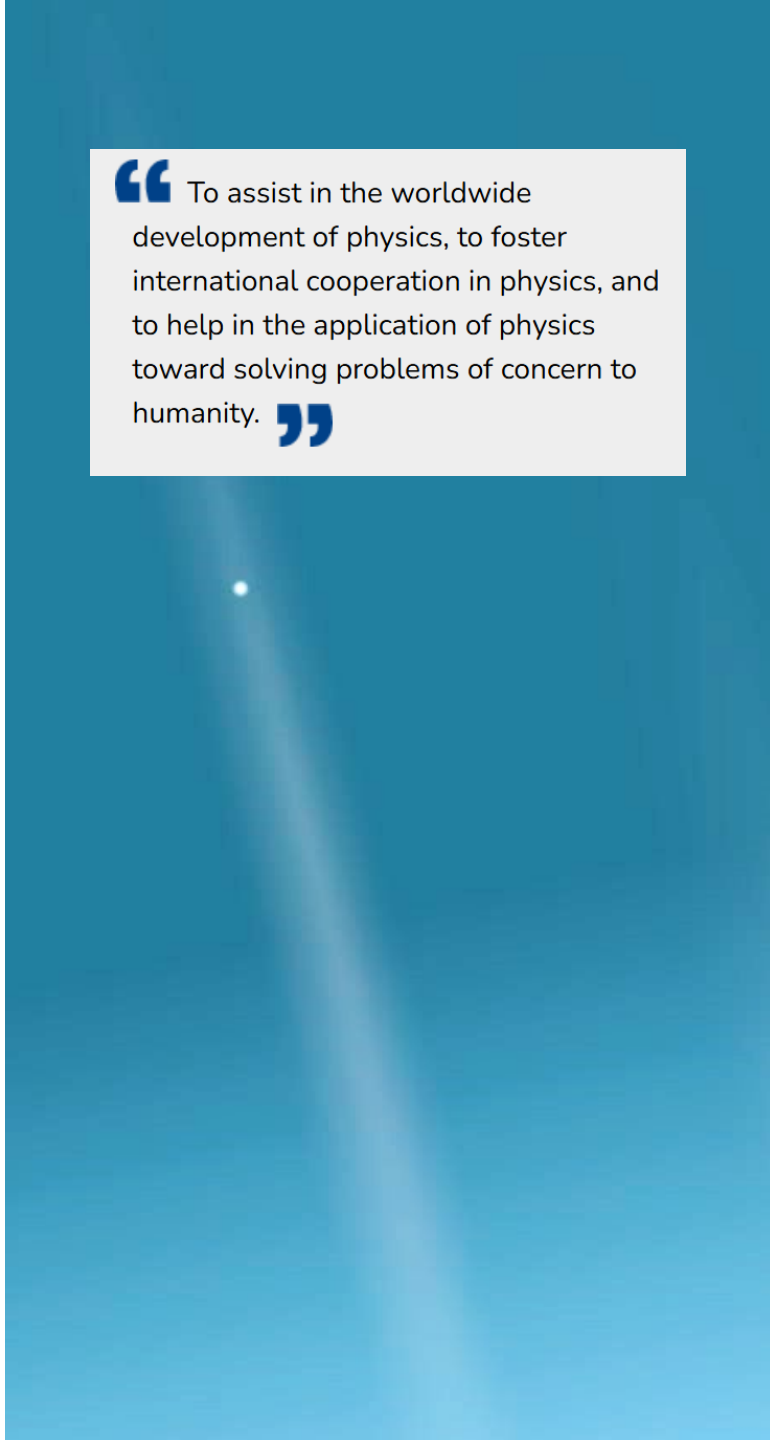


"The pale blue dot" artwork based on
https://science.nasa.gov/mission/voyager/voyager-1s-pale-blue-dot/
The Pale Blue Dot is a photograph of Earth taken on Feb. 14, 1990, by NASA's Voyager 1 spacecraft.
Image credit Marian de Pontes

Behind the Scenes

- Scientific Committee
  - Chair: Michel Spiro
- Sponsorship Committee
  - Chair: Sunil Gupta
- IOC
  - Chair: Igle Gledhill
- LOC
  - Chair: Rudolph Erasmus

> To assist in the worldwide development of physics, to foster international cooperation in physics, and to help in the application of physics toward solving problems of concern to humanity.



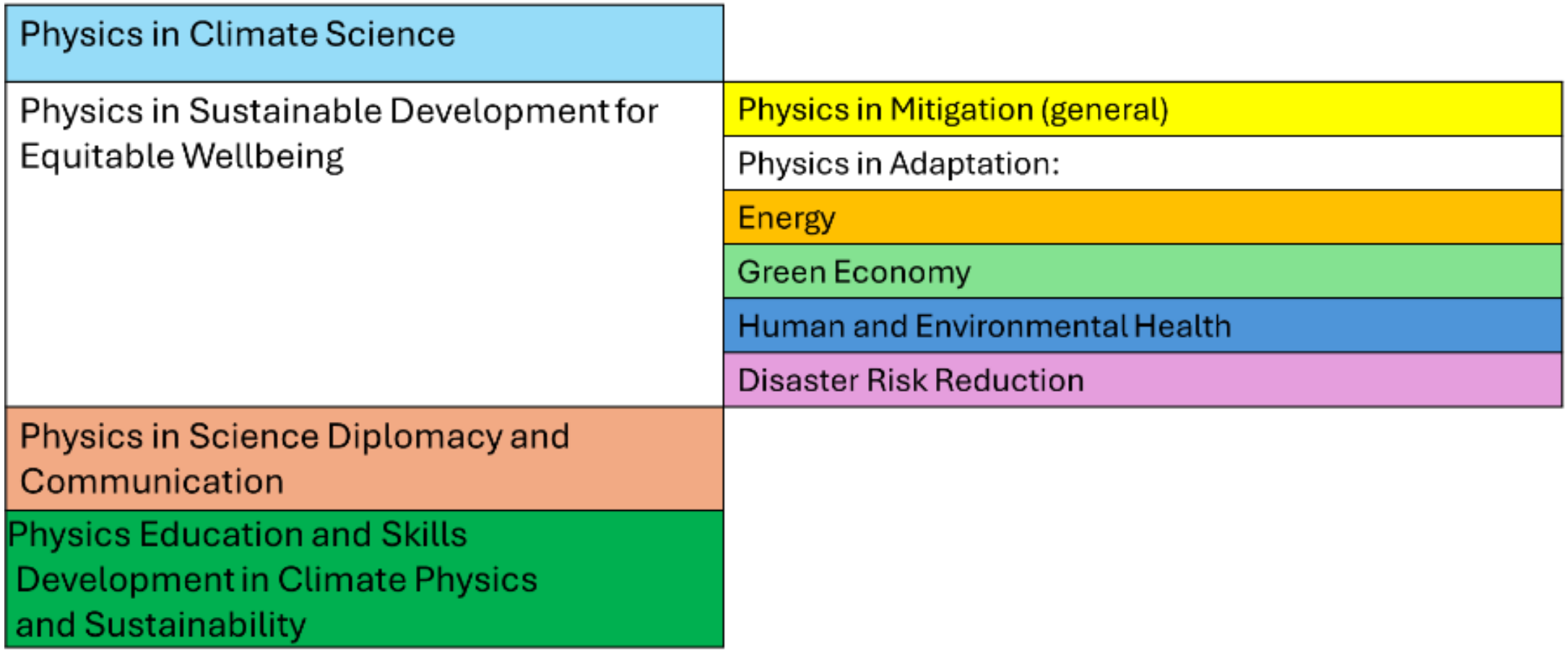
“The pale blue dot” – “that’s us” …*Carl Sagan*

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Physics in Climate Science
Physics in Sustainable Development for Equitable Wellbeing
Physics in Science Diplomacy and Communication
Physics Education and Skills Development in Climate Physics and Sustainability
Physics in Mitigation (general)
Physics in Adaptation:
Energy
Green Economy
Human and Environmental Health
Disaster Risk Reduction

1. **Physics in Climate Science**

- including physics-powered solutions in climate science and observation;
- Earth Systems Models, fundamental physics needed in models; validation; the science of attribution, data integrity;
- evidence in terms of Earth Observation, oceanography, atmospheric physics and meteorology, geophysics, polar science and ice mechanics;
- the nature of evidence and of uncertainty;
- sensors, satellites, platforms and system integration (buoys, gliders, autonomous underwater vehicles, shipboard observations, ground stations, mobile land platforms); satellites and systems,
- space science and planetary science;
- the fundamental natures of stochastic forcing in complex systems, fundamental physics shedding light on climate; chaos theory, non-linear dynamics, turbulence; novel modelling, monitoring, observations;
- machine learning & AI, data science

2. Physics in Sustainable Development for Equitable Wellbeing:

- **2.1 Mitigation & Adaptation**
- including emissions reduction, carbon sequestration

2.2 Energy

- including physics in energy systems for a low-C future
- energy efficiency, energy saving - lean buildings and lean transportation systems
- renewable energy generation and storage, solar, wind, tidal, hydroelectric, geothermal and generation systems
- sustainable practice, local adaptation, low cost systems and physics for development
- fusion energy, major facilities and start-ups; superconductivity; nuclear energy, microreactors
- new physics, sustainability considerations
- transmission networks, stability and dynamics

2.3 Physics in the green economy

- materials for the future, condensed matter physics and materials science
- sustainable manufacturing, lasers in industry
- natural lighting and daylighting, sustainable ventilation and cooling, building systems and materials, low-cost materials
- urban hotspots, rural protection, coastal protection
- novel recycling
- nanotechnologies for energy conversion;
- Sustainable High Energy Physics, sustainable physics labs, computing, data management, and AI

2.4 **Physics in human and environmental health**

- including medical physics, radiology, novel image processing
- physics for health, solutions for heat-health impacts
- lasers, optical physics and photonics
- diagnostics: quantum sensors, microfluidics, accessible low-cost medical care, diagnostics in the field
- vaccines and treatments, vector control – biophysics, bioinformatics, electronic structure methods, synchrotrons, nanoscience
- physics applied to the Food-Water-Energy nexus: clean water (water purification), energy provision
- applications to pests and diseases in agriculture and pastoralism, metagenomics, soil science, resilient crops; fish stock monitoring, physics in the economy of the ocean; toxin sensors in foods
- innovative support of subsistence farmers and fisheries, onsite refrigeration; adaptation to harsh environments, shade and cooling hubs, dust protection, precision farming
- the biosphere, observation and modelling, regenerative science

2.5 **Physics in Disaster Risk Reduction**

- the nature of severe events: storms, flooding, drought, heat stress;
- effective Early Warning Systems and community inclusion
- very low-cost weather and climate station support
- fire sensors, soil sensors
- rescue support, novel personal protective equipment, rescue systems, wearable beacons; hospital and clinic support and systems
- disaster recovery and systems
- resilient infrastructure for the future;

3 **Physics in Science Diplomacy and Communication**

- Science diplomacy, policy, climate justice
- law and ethics in climate change, inequality, vulnerability and preparedness across the globe
- physics for development
- cross-border warning systems and data sharing, climate data governance and interoperability
- physics applied in quantitative finance, financial sector stability, equitable access to finance, insurance, climate finance, fiscal stress due to climate change
- predictive analysis
- science communication, misinformation, disinformation; methods of communication
- government-private-sector-academia-community-environment systems for action
- citizen science
- Physics as a fundamental discipline and also as a strategic transdisciplinary partner

4. **Physics Education and Skills Development in Climate Physics and Sustainability**

- Physics education methods, curriculum development
- education providing skills in computing and AI, and interpretation
- critical thinking, reasoning methods, scientific method, understanding uncertainty
- career advice, availability of jobs; courses for established physicists
- reducing the disproportionate impact of climate change on women
- entrepreneurship and innovation
- Status and progress across countries in physic education for climate change action and sustainability

IUPAP has an enormous potential to play a leading role in such an enterprise.

Its diversity from biophysics to nuclear and astrophysics covers all major branches of physics.

Run by the physics community itself, it is independent and free.

Each community might not have much impact. But if all branches get together and speak with one voice, it could make a major difference.

Pietro Ubertini

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