



## General Scientific Meeting

May 17<sup>th</sup> 2023

Université de Namur, Rue Grafé 2, 5000 Namur



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## PROGRAM

(main hall for registration, coffee break, lunch & poster session;  
auditorium S01 for plenary sessions; rooms S05 to S09 for parallel sessions)

- 08:15 – 09:00 Registration and coffee  
09:00 – 09:10 Welcome by the BPS President  
Chair : Bastien Vispoel  
09:10 – 10:00 **Plenary Lecture 1 : Martine de Mazière (BIRA – IASB)**  
*Monitoring the Earth atmosphere composition using infrared spectrometry*  
10:00 – 10:50 **Plenary Lecture 2 : Olivier Deparis (UNamur)**  
*Parchments & skins: physical methods for the identification of animal species in historical manuscripts*  
10:50 – 11:20 Coffee break  
11:20 – 11:30 Introduction to Young Speaker Contest  
11:30 – 12:30 **Young Speaker Contest** (3 oral talks of 15 minutes)  
Chair: Fabrice Louche (ERM – KMS)
  - *Photonics for personal thermal regulation*  
Muluneh G. Abebe (UMons)
  - *Exploring the Higgs sector at LHC and Future Colliders*  
Paola Mastrapasqua (UCLouvain)
  - *Mechanisms of DNA-mediated allostery*  
Midas Segers (KULeuven)

12:30 – 14:30 Walking lunch and **Poster session**  
14:30 – 16:45 **Parallel sessions**  
16:45 – 17:15 **Poster session**  
17:15 – 18:00 Closing ceremony  
Announcements of **Master Thesis, Best Poster & Young Speaker prizes**

## Parallel sessions

- Astronomy, Astrophysics, Geophysics, and Plasma Physics (Room S05)
- Biophysics and Medical Physics (Room S06)
- Condensed Matter and Nanophysics (Room S07)
- Fundamental Interactions, Particle and Nuclear Physics (Room S08)
- Physics and Education (in French) (Room CH11)
- Quantum Physics, Atoms, Molecules, and Optics (Room S09)

<b>Astronomy, Astrophysics, Geophysics, and Plasma Physics (Room S05)</b>	
<i>Chair: Dr. Jérémy Rekier (Royal Observatory of Belgium)</i>	
14:30 – 15:00	INVITED: Fleur Seuren (Royal Observatory of Belgium – KULeuven) The influence of stably stratified layers in the fluid cores of planets
15:00 – 15:20	Sheng-An Shih (UCLouvain - Royal Observatory of Belgium) Turbulence in the boundary layer of precession-driven flow
15:20 – 15:40	Đorđe Savić (ULiège) Self-gravitating systems in astrophysics and modern interpretation
15:40 – 16:00	Patrick Palmeri (UMons) On the Importance of Using Realistic Partition Functions to Model Kilonova Opacities
16:00 – 16:20	Paramita Dasgupta (ULB) Diffuse Neutrino Search in Full Livetime of the South Pole based Askaryan Radio Array experiment
16:20 – 16:40	Loïc Trompet (Royal Belgian Institute for Space Aeronomy – Unamur) Mars atmosphere carbon dioxide density and temperature sounded by the NOMAD instrument onboard ESA's Trace Gas Orbiter

<b>Biophysics and Medical Physics (Room S06)</b>	
<i>Chair: Dr. Sébastien Penninckx (Hôpital Universitaire de Bruxelles)</i>	
14:30 – 15:00	INVITED: Alessia Gasparini (University of Antwerpen) FLASH Radiation Therapy: Hype or trend?
15:00 – 15:20	Lucas Schoenauen (UNamur) Usability of C. Elegans as a model to investigate the FLASH effect in protontherapy
15:20 – 15:40	Florent Fritsche (UMons) Monte Carlo Simulations of the T2 relaxivity induced by Cubic Shaped Superparamagnetic Nanoparticles
15:40 – 16:00	Shalini Iyer (UNamur) Using gold nanoparticles and proton therapy to reprogram macrophages for improving cancer radiotherapy
16:00 – 16:20	Guillaume Houyoux (ULB – Institut Jules Bordet) Characterization of ionization chambers in proton therapy
16:20 – 16:40	Yannick Stulens (UHasselt) Use of DNA thermodynamics for low-abundance mutation detection by DNA hybridization

<b>Condensed Matter and Nanophysics (Room S07)</b>	
<i>Chair: Prof. Luc Henrard (UNamur)</i>	
14:30 – 15:05	INVITED: M. J. Verstraete (ULiège) Polarons and non-polarons from first principles
15:05 – 15:25	A. Honet (UNamur) Correlation effects on the topological end states of finite size graphene nanoribbons
15:25 – 15:45	S. Klimin (UAntwerpen) Collective excitations of superconductors and Fermi superfluids in the BCS-BEC crossover
15:45 – 16:05	L. Siciliani (Sciensano – UAntwerpen) Characterisation of nanocellulose applied in the food chain by electron microscopy
16:05 – 16:25	W. Zulfiqar (Faisalabad) Enriched thermodynamical synthesis feasibility of chalcogen-doped SrTiO <sub>3</sub> as visible-light driven photocatalysts: A first-principles study
16:25 – 16:45	E. Guillaume (UHasselt & UNamur) Investigation of growth-related mechanisms of (100)-(2x1):H diamond by means of first principle calculations

<b>Fundamental Interactions, Particle and Nuclear Physics (Room S08)</b>	
<i>Chair: Prof. Evelyne Daubie (UMons)</i>	
14:30 – 15:15	INVITED: Juan Antonio Aguilar Sánchez (ULB) IceCube: A decade of Neutrino Astronomy
15:15 – 15:35	Vanden Bemden Max (ULB) Measurement of Drell-Yan lepton pair mass in proton-proton collisions at $\sqrt{s}=13$ TeV
15:35 – 15:55	Pierre-Alexandre Petitjean (ULB) Supernova neutrino physics with JUNO
15:55 – 16:15	Yannis Georis (UCLouvain) Effects of flavour and CP symmetries on low-scale leptogenesis
16:15 – 16:35	Paul Vaandrager (ULB) The Jost function and Siegert pseudostates from R-matrix calculations at complex wavenumbers

<b>Physics and education – in French (Room CH11)</b>	
<i>Workshop leader: Prof. Gabriel Dias De Carvalho Junior (UNamur)</i>	
14:30 – 16:15	<p>Atelier “Mesurer la hauteur d’un immeuble avec un baromètre” ou “comment évalue-t-on les apprentissages en physique ?”</p> <p>On peut raconter une anecdote sur une dispute entre un enseignant et un élève concernant une question posée lors d'un contrôle de physique : "Expliquez comment il est possible de déterminer la hauteur d'un immeuble à l'aide d'un baromètre". L'enseignant était prêt à donner une note zéro, tandis que l'élève pensait mériter une note parfaite de 20/20.</p> <p>Cette anecdote sera le point de départ d'une discussion théorique sur les enjeux de l'évaluation des apprentissages en physique, en examinant plusieurs initiatives d'évaluation à grande échelle. Dans la première partie, nous proposerons une activité pratique de rédaction et de correction de questions. En guise de conclusion, nous aborderons une discussion collective sur les critères et les normes, ainsi que les contradictions intrinsèques aux processus d'évaluation en physique.</p> <p>Minimum : 10 participants</p>

<b>Quantum Physics, Atoms, Molecules, and Optics (Room S09)</b>	
<i>Chair: Dr. Sébastien Mouchet (UNamur &amp; University of Exeter)</i>	
14:30 – 15:00	<p>INVITED: Aurélia Chenu (Université du Luxembourg) Quantum dynamics in noisy systems: the qubit example and the SOV-OTOC correspondence</p>
15:00 – 15:15	<p>Lorena Ballesteros Ferraz (UNamur) Geometrical interpretation of the argument of weak values</p>
15:15 – 15:30	<p>Xavier Urbain (UCLouvain) Decay dynamics and angular correlation of a pair of H(2p) atoms produced by photodissociation of H<sub>2</sub></p>
15:30 – 15:45	<p>Steve Smeets (UMons) General framework: two-photon spontaneous emission near plasmonic structures</p>
15:45 – 16:00	<p>Nicolas Roy (UNamur) Engineering of Photonic Devices Using Highly Data-Efficient Computational Intelligence: Application to Vortex Phase Mask Coronagraphs</p>
16:00 – 16:30	<p>INVITED: Mohamed Boutghatin (Université de Lille) Microstructured Textile Membranes for Human Body Thermoregulation</p>

## Poster sessions

(main hall 12:30 – 14:30 and 16:45 – 17:15)

- AAGPP: Astronomy, Astrophysics, Geophysics, and Plasma Physics
- BMP: Biophysics and Medical Physics
- CMN: Condensed Matter and Nanophysics
- FIPNP: Fundamental Interactions, Particle and Nuclear Physics
- QPAMO: Quantum Physics, Atoms, Molecules, and Optics

*	AAGPP1	Loïc Trompet (Royal Belgian Institute for Space Aeronomy - UNamur) Mars atmosphere carbon dioxide density and temperature sounded by the NOMAD instrument onboard ESA's Trace Gas Orbiter
	AAGPP2	Patrick Palmeri (UMons) On the Importance of Using Realistic Partition Functions to Model Kilonova Opacities
	BMP1	Éléonore Hardy (UNamur) Metabolic Control of Different Responses of Human Cancer Cells to X-Ray and Proton Radiotherapy
*	BMP2	Éléonore Martin (UMons) Monte Carlo and Experimental Study of the Magnetic Behaviour of Superparamagnetic Nanoparticles
*	BMP3	Zahra Kayani (UNamur) Anti CD206 peptide (mUNO) conjugated poly-ethylene glycol (PEG) coated gold nanoparticles (mUNO-PEG-AuNPs as an Efficient Probe for Mannose Receptor Targeted Radiotherapy and Reprogramming macrophages
	BMP4	Charlotte Rossi (UNamur) ToF-SIMS as a tool to study membrane lipids alteration after CONV and UHDR proton irradiation
	CMN1	Marina Simovic Pavlovic (University of Belgrade) Revealing Self-organization of Granular Matter: From Fundamental Physics to Military Technology Applications
	CMN2	Trung T. PHAM (UNamur) h-BN monolayer transferred on Si substrate
	CMN3	Bruno Majérus (UNamur) Plasmons in nanostructured and corrugated 2D materials
	CMN4	Jean-François Colomer (UNamur) Synthesis by atmospheric pressure chemical vapor deposition and characterization of hBN monolayer
*	CMN5	Vana Chinnappa Chinnabathini (KULeuven) Gas phase deposition of well-defined bimetallic gold-silver clusters for photocatalytic applications
*	CMN6	Tanguy Colleu (UNamur) Simulation of surface enhanced vibrational spectroscopy
	CMN7	Mohamed Achehboune (UNamur) Atomistic insights into the nucleation and growth of hexagonal boron nitride (hBN) and graphene: A DFT study

*	FIPNP1	Hannah Duval (VUB) Variations of Starobinsky inflation in closed universes
	FIPNP2	Evelyne Daubie (UMons) Comparative Study of Ionization Current Measurement Method by Marie and Pierre Curie versus Modern Electrometer Usage
*	QPAMO1	Mhamad Hantro (UMons) Modeling quantum emitters beyond the dipolar approximation in proximity to nanophotonic structures
	QPAMO2	Gossuin Yves (UMons) Nuclear Magnetic Resonance relaxometry to monitor chromium (VI) reduction by hydrogen peroxide, ascorbic acid and aluminum powder
*	QPAMO3	Eduardo Marin Bujedo (UCLouvain) A 3D-printed permanent-magnet Zeeman slower
*	QPAMO4	Jean Clément (UNamur) Line shape parameter study of methane transitions by mid-infrared dual-comb spectroscopy
*	QPAMO5	Debacq Adrien (UNamur) Design of near-zero refractive index photonic crystal laser
*	QPAMO6	Marina Simovic Pavlovic (University of Belgrade) Monitoring the Formation of Oxygen Bubble Patterns as a Forecast for Reaction Dynamics
	QPAMO7	Marina Simovic Pavlovic (University of Belgrade) Revealing the Impact of Different Shapes of Light on the Briggs-Rauscher Oscillatory Dynamics
	QPAMO8	Maison Lucas (UMons) Multiconfiguration Dirac-Hartree-Fock calculations of the A hyperfine constant for the ground state of 137-Ba II
*	QPAMO9	Rousseau Cédric (UMons) Effective modeling for hybrid nanoscale platforms: multi-modal photothermal and MRI applications
	QPAMO10	Thomas MICHEL (ULiège) Out-of-time-ordered correlators in Bose-Hubbard systems
	QPAMO11	Tom Weelen (ULiège) Entanglement classification schemes: comparison between Majorana representation and algebraic geometry approaches
	QPAMO12	Sébastien R. Mouchet (UNamur & University of Exeter) Photonic structures in the integuments of two species of fly
	QPAMO13	Yves Caudano (UNamur) Geometric Phases in Weak Measurements: from Quantum Paradoxes to Optical Sensing
	QPAMO14	Raphaël Marion (UCLouvain) Absolute cross sections and asymmetry parameters for photodetachment of excited C- (2D)
*	QPAMO15	Jean-Pierre Fréché (UNamur) Generalization of the Wigner Transform

(\* ) Poster participating in the best poster contest

## Conference organization

Organizing committee	Scientific committee
<p><i>Local</i></p> <p>Yves Caudano (UNamur)            Luc Henrard (UNamur)            Michaël Lobet (UNamur)            Sébastien Mouchet (UNamur)            Bastien Vispoel (UNamur)</p> <p><i>BPS</i></p> <p>Yves Caudano (UNamur)            Gilles De Lentdecker (ULB)            Fabrice Louche (ERM – KMS)            Jef Ongena (ERM – KMS)</p>	<p>Yves Caudano (UNamur)            Bart Cleurens (UHasselt)            Evelyne Daubie (UMons)            Gilles De Lentdecker (ULB)            Luc Henrard (UNamur)            Ewald Janssens (KULeuven)            Jean-Claude Jodogne (IRM – KMI)            Michaël Lobet (UNamur)            Fabrice Louche (ERM – KMS)            Sébastien Mouchet (UNamur)            Jef Ongena (ERM – KMS)            Sébastien Penninckx (H.U.B.)            Jérémy Rekier (Royal Observatory of Belgium)            Bastien Vispoel (UNamur)</p>