PROCEEDINGS OF SCIENCE

Foreword to the Proceedings of the Corfu Summer Institute "School and Workshops on Elementary Particle Physics and Gravity" (CORFU2021)

Dedicated to the memory of John Madore and Graham Ross

1. Foreword

These are the Proceedings of the scientific activities of CORFU2021, the 20th Hellenic School and Workshops on Elementary Particle Physics and Gravity, which took place from August 29th to October 9th, 2021. The Workshops were hosted by the European Institute for Sciences and their Applications (EISA) in the conference center of the former Royal Palace Garden of Mon Repos *in Corfu*, *Greece*. The Corfu2021 activities consisted of **one School and seven Workshops**, bringing together world-class scientists and young researchers to interact and forge new collaborations.

Specifically, the CORFU2021 hosted the following sessions:

- *Workshop on the Standard Model and Beyond*,
- *Workshop on Celestial Amplitudes and Flat Space Holography*,
- *Workshop on New Developments in Quantum Gravity and String Theory*,
- *Workshop on Quantum Features in a de Sitter Universe*,
- *Humboldt Kolleg on Quantum Gravity and Fundamental Interactions*,
- *Workshop on Quantum Geometry, Field Theory and Gravity*,
- *School on Quantum Gravity Phenomenology in the Multi-Messenger Approach*,
- *Workshop on Quantum Gravity Phenomenology in the Multi-Messenger Approach*.

It is worth noting that the CORFU2021 meetings were one of the first worldwide meetings that took place after the pandemic period. Another record was that the CORFU2021 managed to host eight sessions, which is far higher than the number of scientific meetings organized during the Corfu meetings up to now. Finally, the number of total participants is another record: 765

All talks (slides and video recordings) can be found on the homepage of CORFU2021:

http://www.physics.ntua.gr/corfu2021

Along with the main scientific programme, there was a rich programme of outreach activities. This included master classes for high school students, seminars for high school teachers, outreach talks for the general public in the Labs of Physical Sciences and the building of the Corfu Reading Society, exhibitions of CERN and Gravitational Waves in the Foyer of the Municipality Theater, interviews in the media (TV, radio and newspapers and in a film supported by COST). In addition, the receptions of the social programme of the various sessions was

PoS(CORFU2021)362

enriched with cultural events given by the "*Old Philarmonica of Corfu*" and the "*Kapodistria Philarmonic Association*" as well as by two choirs, "*Domokos*" *and* "*Flaggeinios*".

These proceedings are dedicated to the memory of John Madore and Graham Ross.

Both were great scientists who made important contributions to their field of Physics. Also, both were very close friends to many of us, contributed in the most significant way in the development of the fields that they were working on, but also in establishing and promoting the Corfu Meetings. We are indeed deeply grateful to both.

With Graham, we started to organize a dedicated festivity. During the Greek night we celebrated and honoured his scientific achievements and the official retirement with main speaker his close friend and collaborator Luis Ibanez. It was a nice initiative which has been repeated several times after Graham and became a tradition. With John, we began last year to hold memorials for close friends who had passed away. For this year, we started off more professionally, and held a Memorial Day for Graham on September 1st, 2022. Later, on September 4th, we held one for another close friend, Costas Kounnas.

Of course, these activities demonstrate that, in the Corfu meetings, we aren't only developing ourselves scientifically, but we are building strong relationships that will follow us into the most important moments of our lives.

John Madore passed away on August 12, 2020, mostly due to the side effects of Parkinson's disease, which he fought bravely with huge courage and humour for several years. John was a beloved friend to several of his colleagues, possessing a unique personality and a dedicated academic research stance. He was friendly to everyone and was always willing to discuss a huge range of subjects. He was also open to scientific collaborations. A rather detailed description of his personal life and academic achievements can be found in (https://eisa.institute/news.html#madore).

In these proceedings, Harald Grosse and Maja Buric present their more personal memories of John as a scientist. The presentation can be found at the beginning of the proceedings of the Noncommutative session.

We deeply sympathize with John's family, especially his wife Geneviève and his son David.

Graham Ross succumbed to a sudden heart attack on November 1st, 2021. He was fit, sportive, full of energy, and ready for new scientific challenges. Nobody could believe that Graham was no longer with us. Graham was a close friend and a lifelong supporter of EISA and its activities. He lectured on QCD in our first Summer School in September 1982, and practically, he did not miss any of our Meetings on Standard Model and Beyond. Over the past few years, Graham has been giving talks on the Beyond the SM, demonstrating that he is always ahead of the field.

PoS(CORFU2021)362

Graham was a close friend to many of us, a brilliant physicist who made many fundamental breakthroughs, and a highly respected colleague. He was also a wonderful man. Subir Sarkar and Dumitru Gilencea provide a much more detailed description of Grahams life and scientific achievements and the honours that he received, which can be found in the front of the proceedings of the Standard Model and Beyond in the present volume. A shorter version can also be found at (https://eisa.institute/news.html#ross).

We would also like from here to express our deepest sympathy to Graham's family, and in particular to his wife Ruth, who was always with him and their children.

John Madore and Graham Ross memory will stay forever in our hearts.

The Corfu Summer Institute has a very long, interesting and successful history. The Corfu Meetings started as a Summer School on Elementary Particle Physics (EPP) for graduate students from Greece in 1982, and since then, it has developed into a leading international Summer Institute in the field of elementary particle physics (covering both experimental and theoretical advances) and more recently of gravity and cosmology. Moreover, it has launched a very extensive outreach program to teachers and high school students that has been greatly appreciated by the local society and scientific community over the years.

The structure of the “Summer Institute on EPP and Gravity 2021” was based on the general format developed, established and tested in all previous Corfu Meetings. The meeting was hosted by the European Institute for Science and their Applications (EISA), which has been the host of the meetings since its foundation in 2006. The aim of EISA is to serve as a permanent extension of the Corfu Summer Institutes, with the additional goal of attracting first-class scientists who can stay in Corfu for a long period and produce a significant research output locally. The scientific activities of CORFU2021 were held in the conference hall of Mon Repos in the town of Corfu, which is the permanent basis of EISA but additionally, due to covid restrictions, in its garden.

As we have previously reported a few times during the recent years, we have had a very exciting development. The Corfu Municipality responded to a call for proposals from the central government and submitted a proposal for the renovation of three old buildings in the garden of Mon Repos. The proposal has been approved, and the grant has provided the funding for the realization of this project. Since last year, we have seen progress with the renovation of the building, and we hope that it will be completed next year. We are hopeful that we will be able to realize the dream of having buildings in Mon Repos to host the participants of the EISA's scientific activities and provide them with office space and the necessary infrastructure next year. With this opportunity, we would like to thank very warmly MPP in Munich for the computers and the rest infrastructure. In particular, we would like to thank the acting directors Wolfgang Hollik, Allen Caldwell and Dieter Lust for their generous offer over the years and

PoS(CORFU2021)362

Thomas Hahn for realizing this project. Equally, very warm thanks are due to ITP Heidelberg and to Christof Wetterich for their generous technical equipment offer.

The first event, ***Workshop on the Standard Model and Beyond*****,** took place from August 29th to September 8th. It was co-organized by:
- the COST Action CA16201 Unraveling new physics at the LHC through the precision frontier (supported by the EU Framework Programme Horizon 2020)
- The National Technical University of Athens
- The Municipality of Corfu
- The Regional Government of the Ionian Islands (Periphery of the Ionian Islands).

The Organizing Committee was:
J. Kalinowski (Warsaw U.), N. Mavromatos (NTUA), M.N. Rebelo (CFTP/IST/U. Lisboa), D. Varouchas (LAL-Orsay), G. Zoupanos (NTUA).

The Advisory Committee was:

F. del Aguila (Granada U.), J. J.A. Aguilar Saavedra (U. Granada), K. N. Anagnostopoulos (NTUA), I. Antoniadis (Ecole Polyt. & CERN), R. Barbieri (SNS, Pisa), M. B. Gavela (Autonoma U., Madrid), D. Ghilencea (IFIN), N. Glover (Durham U., IPPP), W. Hollik (MPI, Munich), J. Kalinowski (Warsaw U.), G. Koutsoumbas (NTUA), C. Papadopoulos (NCSR Demokritos), R. Pittau (U. Granada), M. N. Rebelo (T. U. Lisbon), A. Ringwald (DESY), G. Rodrigo (IFIC Valencia), S. Sarkar (Oxford U.), E. Tsesmelis (CERN), D. Varouchas (LAL-Orsay), A. Weiler (TU Munich), G. Zanderighi (CERN & Oxford U.).

The second event, ***Workshop on Celestial Amplitudes and Flat Space Holography*****,** took place from Aug 29 - Sep 05, 2021. It was co-organized and supported by:
- the National Technical University of Athens,
- the Municipality of Corfu,
- the Regional Government of the Ionian Islands (Periphery of the Ionian Islands) and
- the Ephorate of Antiquities of Corfu.

The Scientific Organizers were:
A. Bissi (Uppsala U.), A. Fotopoulos (Northeastern U.), A. Puhm (Ecole Polytechnique), S. Stieberger (LMU Munich)

PoS(CORFU2021)362

The third event, ***Workshop on New Developments in Quantum Gravity and String Theory***, took place from September 11th to 18th, 2021. It was co-organized and supported by:

- the National Technical University of Athens,
- the Municipality of Corfu,
- the Regional Government of the Ionian Islands (Periphery of the Ionian Islands) and
- the Ephorate of Antiquities of Corfu.

The Scientific Organizers were:
A. Chatzistavrakidis (Bošković Inst.), D. Giataganas (NKU Athens), M. Grana (Saclay SPhT), A. Kehagias (NTU Athens), D. Lüst (LMU & Max Planck Inst), R. Szabo (Heriot-Watt U.)

The fourth event, the ***Workshop on Quantum Features in a de Sitter Universe***, took place from September 13th to 19th 2021.
It was co-organized and supported by:

- the National Technical University of Athens,
- the Municipality of Corfu,
- the Regional Government of the Ionian Islands (Periphery of the Ionian Islands),
- the Ephorate of Antiquities of Corfu, and
- Prof. T. Anous's personal grant.

The Scientific Organizers were:
D. Anninos (King's College), T. Anous (U. Amsterdam), F. Denef (Columbia U.), G. Pimentel (U. Amsterdam), R. Rosen (Columbia U.).

The fifth event, ***Humboldt Kolleg on Quantum Gravity and Fundamental Interactions***, took place from September 17th to 21st 2021. It was supported by the Alexander von Humboldt-Stiftung/Foundation and co-organized by:

- the National Technical University of Athens,
- the Municipality of Corfu,
- the Regional Government of the Ionian Islands (Periphery of the Ionian Islands) and
- the Ephorate of Antiquities of Corfu.

The Scientific Organizers were:
C. Angelantonj (Turin U. & INFN, Turin), C. Bachas (ENS, Paris), E. Dudas (Ecole Polyt. & Orsay, LPT), A. Kehagias (NTUA), D. Lüst (LMU & Max Planck Inst), H. Nicolai (MPI, Potsdam), P. Vitale (U. Napoli Federico II & INFN), G. Zoupanos (NTUA).

PoS(CORFU2021)362

The sixth event, ***Workshop on Quantum Geometry, Field Theory and Gravity***, took place from September 20th to 27th 2021. It was co-organized and supported by:

- the National Technical University of Athens,
- the Municipality of Corfu,
- the Regional Government of the Ionian Islands (Periphery of the Ionian Islands) and
- the Ephorate of Antiquities of Corfu.

The Scientific Organizers were:
K.N. Anagnostopoulos (NTUA), P. Aschieri (U. Piemonte Orientale), H. Kawai (Kyoto U), F. Lizzi (INFN, Napoli), J. Nishimura (KEK & SOKENDAI, Tsukuba), D. O'Connor (Dublin Institute Adv Studies), H. Steinacker (Vienna U.), R. Szabo (Heriot-Watt), S. Watamura (Tokohu U.), G. Zoupanos (NTUA).

The seventh event, ***School on Quantum Gravity Phenomenology in the Multi-Messenger Approach***, took place from September 26th to October 6th 2021.
It was co-organized and supported by:

- the COST: CA18108 - Quantum gravity phenomenology in the multi-messenger approach,
- the National Technical University of Athens,
- the Municipality of Corfu,
- the Regional Government of the Ionian Islands (Periphery of the Ionian Islands) and
- the Ephorate of Antiquities of Corfu.

The Scientific Organizers were:
J.M. Carmona (U. de Saragoza), C-P. de los Heros (Uppsala U.), A. di Matteo (INFN Turin), G. Gubitosi (U. Burgos), G. Djordjevic (U. Nis, Serbia), N. Mavromatos (NTU Athens & King's College), F. Mercati (U. Napoli "Federico II" & INFN), C. Pfeifer (ZARM, U. Bremen), E. Saridakis (N.O. Athens), T. Terzić (U. Rijek).

The eighth event, ***Workshop on Quantum Gravity Phenomenology in the Multi-Messenger Approach***, took place from October 5th to 9th 2021.
It was co-organized and supported by:

- the COST: CA18108 - Quantum gravity phenomenology in the multi-messenger approach,
- the National Technical University of Athens,

PoS(CORFU2021)362

- the Municipality of Corfu,
- the Regional Government of the Ionian Islands (Periphery of the Ionian Islands) and
- the Ephorate of Antiquities of Corfu.

The Scientific Organizers were:
J.M. Carmona (U. de Saragoza), G. Gubitosi (U. Burgos), F. Mercati (U. Napoli "Federico II" & INFN), E. Saridakis (N.O. Athens).

The outcome was indeed very impressive, given that the sessions gathered 765 participants! in total. In short, internationally leading scientists have been gathered to participate in the School and Workshops, giving lectures and creating a unique and stimulating scientific environment for the senior as well as the young scientists.

More specifically, the ***Workshop on the Standard Model and Beyond*** attracted a total of 160 senior and young scientists; 70 of them participated in person; 131 of them presented their current research project as workshop speakers.

The full programme of the Workshop was the following:

29th of August 2022
Arrival Day

30th of August 2022

9:10 – 09:30	Opening	
09:30 – 10:30	Albert De Roeck (CERN)	Highlights of CMS
10;30-11:30	Louis Fayard (Centre National de la Recherche Scientifique)	Highlights of ATLAS
11:30 - 12:00	Coffee break	
12:00 - 12:30	Franco Buccella (Napoli U.)	Status of the Statistical Parton Distributions
12:30 - 13:00	Paul Frampton (University of Salento)	Additional Baryons and Mesons
13:00 – 13:30	Nikolaos Davis (Institute of Nuclear Physics PAN, Krakow)	Intermittency analysis in heavy ion collisions: a review of the current status and challenges
13:30 - 16:00	Lunch break	
16:00 – 16:30	Matthias Neubert (Johannes Gutenberg U. Mainz)	Resummation of Superleading Logarithms

PoS(CORFU2021)362

16:30 – 17:00	Georgios Papathanasiou (DESY)	Cluster Algebras for Feynman Integrals
17:00-18:00	Zbigniew Was (IFJ PAN)	Symmetries of spin amplitudes: applications for factorization and Monte Carlo solutions
18:00 - 18:20	Coffee break	
18:20-18:40	Yassine El Ghazali (Ibn-Tofail University)	Search for heavy diboson resonances in semileptonic final states in pp
18:40 – 19:00	Dhimiter Canko (NSCR "Demokritos" and NKUA)	Progress on Multiloop calculations
19:00 - 19:30	Manuel Asorey (Universidad de Zaragoza)	Asymptotic Freedom and Higher derivative Yang Mills theories

20.00 Welcome Drink Reception-Concert

31st of August 2022

09:00 – 9:30	Kostas Kordas (Aristotle University of Thessaloniki)	SM (EW+QCD) measurements in ATLAS and CMS
09:30 - 10:00	Fotis Diakonos (NKUA)	New coordinates for the search of the QCD critical behaviour in A+A collisions
10:00 - 10:30	Mikhail Shaposhnikov (EPFL)	Conformal symmetry: towards the link between the Fermi and the Planck scales
10:30 - 11:30	Welcome and Coffee break	
11:30 - 12:00	Mieczyslaw Krasny (LPNHE, Sorbonne University, Paris, and CERN)	Gamma Factory: status and physics highlights
12:00 - 12:30	Mariano Quiros Carcelen (IFAE)	A continuum solution to the hierarchy problem
12:30 – 13:00	Bohdan Grzadkowski (University of Warsaw)	t-channel singularities
13:00 – 13:30	Karim Benakli (LPTHE-CNRS-Sorbonne U,)	Dilatonic (Anti-)de Sitter Black Holes and Weak Gravity Conjecture
13:30 - 16:00	Lunch break	
16:00 – 16:30	Michele Tammaro (Jozef Stefan Institute)	Interplay of New Physics Effects in (g-2) and h -> l+l- -- Lessons from SMEFT
16:30 – 17:00	Jacky Kumar (TU Munich)	Renormalization group improved implications of Semileptonic Operators in SMEFT

PoS(CORFU2021)362

17:20 – 17:50	Albert De Roeck (CERN)	Neutrino: experiment
17:50 - 18:10	Coffee break	
18:10 – 18:40	Nazila Mahmoudi (Lyon University & CERN)	New Physics Implications and prospects of LHCb flavour anomalies
18:40 - 19:10	Diego Guadagnoli (CNRS)	e + invisible through a novel approach
19:10 - 19:40	James Michael Keaveney (University of Cape Town)	Top physics in ATLAS and CMS
19:40 - 20:10	Claudio Corianò (Univ. of Salento)	Dimensional Regularization, Gauss Bonnet terms and anomaly actions for modified Gravity

1st of September 2022

9:00 – 9:30	Paul Asmuss (Deutsches Elektronen-Synchrotron (DE))	Higgs studies in ATLAS and CMS
9:30 – 10:00	Werner Porod (Uni Wurzburg)	Phenomenology of unusual top partners in Composite Higgs Models
10:00 – 10:30	Francisco Jose Botella Olcina (IFIC CSIC-U. Valencia)	Relating the phase of CKM and PMNS matrices in 2HDM
10:30 – 11:00	Ivanka Bozovic-Jelisavcic (VINCA Institute of Nuclear Sciences, University of Belgrade)	Linear e+e- colliders - future Higgs factories
11:00 - 11:30	Coffee break	
11:30 - 12:00	Antonio Morais (Aveiro University)	Sculpting the Standard Model from low-scale Gauge-Higgs-Matter Grand Unification
12:00 – 12:30	Tania Robens (Rudjer Boskovic Institute (HR))	Constraining extended scalar sectors at current and future colliders
12:30 – 13:00	Marcin Badziak (University of Warsaw)	Flavor-violating Higgs decays and stellar cooling hints in axion models
13:00 – 13:30	Krzysztof Meissner (University of Warsaw)	E(10) symmetry, Dark Matter, Cosmic Rays and Giant Black Holes
13:30 - 16:00	Lunch break	
16:00 – 16:30	Wojciech Kotlarski (TU Dresden)	FlexibleDecay: An automated calculator of scalar decay widths
16:30-17:00	Miguel Levy (CFTP/IST)	Exploring multi-Higgs models with softly broken large discrete symmetry groups

PoS(CORFU2021)362

17:00 - 17:30	Miguel Bento (IST, CFTP)	Invariants of multi-Higgs doublet models
17:30 – 17:50	Mohamed Belfkir (LAPP-IN2P3)	Interpretations of the search for Higgs boson pair production in the two bottom quarks plus two photons final state with the ATLAS detector
	Bernardo Gonçalves (University of Aveiro)	Some reflections on hidden features of SM extensions with scalar triplets
17:50 - 18:10	Coffee break	
18:10 - 19:10	Markus Zerlauth (CERN)	HL-LHC Project
19:10 - 19:30	Isabella Oceano (Unisalento, INFN Lecce)	Searching for light dark matter with the PADME experiment
19:30 – 20:00	Ann-Kathrin Perrevoort (Nikhef National institute for subatomic physics (NL))	Exotics and BSM in ATLAS and CMS (non-DM, non-SUSY searches)

2nd of September 2022

9:00 – 9:45	Monica Pepe-Altarelli (CERN)	Review of rare decays and tests of Lepton Flavour Universality at LHCb
9:45 – 10:30	Neville Harnew (University of Oxford)	Review of CP-violation and spectroscopy measurements at LHCb
10:30 – 11:00	Ivo de Medeiros Varzielas (IST)	Multiple modular symmetries as the origin of flavour
11:00 - 11:30	Coffee break	
11:30 - 12:00	Gustavo Branco (CFTP/IST, U. Lisboa)	Aspects of flavour with vector-like quarks
12:00 – 12:30	Steve King (University of Southampton)	Twin Pati-Salam theory of flavour with a TeV scale vector leptoquark
12:30 – 13:00	Antonio Di Domenico (Sapienza University of Rome and INFN Rome)	Recent results with entangled neutral kaons at KLOE-2
13:00 – 13:30	Rui Santos (ISEL & CFTC-UL)	CP-violation measurements at the LHC
13:30 - 16:00	Lunch break	
16:00 – 16:30	Giuseppe Vitiello (University of Salerno, Salerno)	Neutrino mixing, entanglement and the gauge paradigm in quantum field theory
16:30-17:00	Joao Penedo (CFTP IST, Lisbon)	Mass hierarchies from residual modular symmetries

PoS(CORFU2021)362

17:00 - 17:20	Joao Goncalves (University of Aveiro)	Deep Learning Searches for Vector-Like Leptons at the LHC and Electron/Muon Colliders
17:20 – 17:40	Michal Ryczkowski (University of Warsaw)	Earth as a baseline for measuring CP violating phase in neutrino oscillations in matter
17:40 - 18:10	Sokratis Trifinopoulos (SISSA, INFN)	A Minimal Explanation of Flavour Anomalies: B-Meson Decays, Muon Magnetic Moment,
18:10 - 18:30	Coffee break	
18:30 - 18:50	Joao Alves (IST)	Extending Trinity to the Scalar Sector
18:50 - 19:20	Pascal Anastasopoulos (Uni. Wien)	String (gravi)photons, "dark brane photons", holography and the hypercharge portal
19:20 – 19:50	Jason Aebischer (UCSD)	Standard Model prediction of the Bc lifetime

3rd of September 2022

09:00 - 10:00	Alexei Smirnov (Max-Planck-Institut fur Kernphysik)	Neutrino physics: theory
10:00 – 10:30	Alexander Studenikin (Moscow State University & JINR)	Overview of neutrino electromagnetic properties
10:30 – 11:00	Jose WF Valle (IFIC, Valencia)	Neutrinos as Pathfinders of New Physics
11:00 – 11:30	Teppei Katori (King's College, London)	Test of Fundamental Physics with Neutrinos

Excursion

4th of September 2022

9:00 – 09:30	Steven Adam Abel (IPPP/Maths Durham)	Understanding the Higgs mass in string theory
09:30 – 10:00	John Rizos (University of Ioannina)	On nonsupersymmetric Pati-Salam string models
10:00 – 10:50	Edward W (Rocky) Kolb (University of Chicago)	The Gravitino Swampland Conjecture
10:50 - 11:10	Coffee break	
11:10 - 11:40	Takuya Morozumi (Hiroshima University)	Time evolution of the lepton numbers of Majorana neutrinos in the Schrödinger picture versus Heisenberg picture
10:40 – 12:10	Pasquale Di Bari (University of Southampton)	Gravitational waves from neutrino mass genesis

PoS(CORFU2021)362

12:10 – 12:40	Massimo Blasone (Univ. di Salerno)	Quantum correlations in neutrino oscillations
12:40 – 13:00	H.P. Fernandes De Noronha Brito Camara (Centro de Física Teórica de Partículas' (CFTP))	Sterile neutrinos with inverse seesaw and Abelian flavour symmetries
13:00 - 15:30	Lunch break	
15:30 – 16:30	Emmanuel Tsesmelis (CERN)	The Future Circular Collider at CERN
16:30 - 17:00	Aleksander Filip Zarnecki (University of Warsaw)	Sensitivity to dark matter production at future e+e− colliders
17:00 - 17:20	Debora Barreiros (CFTP/IST, Universidad de Lisboa)	Neutrino masses from minimal scoto-seesaw mechanism with spontaneous CP violation
17:20 – 17:40	P.M. F. Pereira (CFTP/IST, Universidad de Lisboa)	Non-Unitary Mixing matrices in Neutrino and Vector-like quark Models
17:40 - 18:00	Coffee break	
18;00 – 18;30	Tomasz Taylor	Celestial Amplitudes
18:30 - 19:00	Athanasios Dedes (University of Ioannina)	Scalar Leptoquark Matching onto SMEFT
19:00 - 19:30	Zygmunt Adam Lalak (University of Warsaw)	Stability of domain walls in BSM models with asymmetric potentials
19:30 – 20:00	Salvatore Capozziello (Univ. di Napoli "Federico II")	The gravitational energy-momentum pseudotensor in higher-order theories of gravity

5th of September 2022

9:00 – 9:30	Ilja Doršner (University of Split)	The Minimal SU(5) Unification Model
9:30 – 10:00	Pablo Matorras-Cuevas (Universidad de Cantabria)	SUSY searches in ATLAS and CMS
10:00 – 10:30	Georgios Leontaris (University of Ioannina)	Minimal Flipped SU(5) from F-theory
10:30 – 11:00	Constantinos Pallis (Aristotle University of Thessaloniki)	Pole Inflation in Supergravity
11:00 - 11:30	Coffee break	
11:30 - 12:00	Alex Pomarol (UAB & IFAE)	Axion mass from the UV
12:00 – 12:30	Apostolos Pilaftsis (University of Manchester)	Geometrising the Micro-Cosmos on a Supermanifold

PoS(CORFU2021)362

12:30 – 13:00	Zoltan Laszlo Trocsanyi (ELTE Eotvos Lorand University)	Phenomenology of the super-weak U(1) extension of the standard model
13:00 – 13:30	Sarben Sarkar (King's College London)	PT Symmetry and Physics Beyond the Standard Model
13:30 - 16:00	Lunch break	
16:00 – 16:20	Maciej Kierkla (University of Warsaw)	Invisible traces of conformal symmetry breaking
16:20-16:40	Marco Merchand Medina (University of Warsaw)	Electroweak Bubble Wall Expansion: Baryogenesis and Gravity Waves in simple extensions of the Standard Model
16:40 - 17:00	Jahmall Bersini (RBI)	Taking charge of O(N): from d=3 to d=6 via the large-charge expansion
17:00 - 17:30	Kazuki Sakurai (University of Warsaw)	SUSY explanation of g-2 without dark matter
17:30 – 17:50	Rishav Roshan (Indian Institute of Technology, Guwahati)	Imprint of the seesaw mechanism on feebly interacting dark matter and the baryon asymmetry
17:50 - 18:10	Coffee break	
18:10 - 18:40	Yann Mambrini (IJCLab, University Paris-Saclay, CNRS)	Particle production in the early stage of the Universe

6th of September 2022

9:00 – 9:30	Ignatios Antoniadis (LPTHE)	Challenges of an accelerating universe in string theory
9:30 – 10:00	Panagiota Kanti (University of Ioannina)	Can we localise asymptotic-AdS black holes in brane-world models?
10:00 – 10:30	Alexander Belyaev (University of Southampton & Rutherford Appleton Laboratory)	Minimal Consistent models for systematic Dark Matter exploration
10:30 – 11:00	Oliver Buchmuller (Imperial College, London)	Interferometric tests of dark matter with AION
11:00 - 11:30	Coffee break	
11:30 - 12:00	Christos Charmousis (Orsay, U. Paris-Sud)	Black holes beyond GR
12:00 – 12:30	Jean-Marie Frere (ULB)	Why is parity restored?
12:30 – 13:00	Holger Nielsen (Copenhagen University, The Niels Bohr Institute)	Dark matter pearls of atomic size and DAMA-LIBRA and Xenon1T see the Same Decays of pearls by Electron or Photon emission

PoS(CORFU2021)362

13:00 – 13:30	Marco Cirelli (LPTHE CNRS/Sorbonne)	Sub-GeV Dark Matter and X-rays
13:30 - 16:00	Lunch Break	
16:00 – 16:20	Valerio D'Andrea (UnivAQ & LNGS)	Dark matter direct search with the XENON experiment
16:20-16:40	Federica Piazza (U. degli Studi di Milano & INFN, Milano)	Search for Dark Matter in association with an energetic photon in pp collisions at sqrt(s) = 13 TeV with the ATLAS detector
16:40 - 17:10	Simone Biondini (University of Basel)	Freeze-in produced dark matter at high temperatures
17:10 -17:30	Coffee break	
17:30 – 18:00	Garcia Juan Herrero (IFIC, University of Valencia)	Dark matter from a complex scalar singlet: The role of dark CP and other discrete symmetries
18:00 – 18:30	George Manolakos (Rudjer Boskovic Institute)	Axion gravitodynamics
18:30 – 19:00	Sabir Ramazanov (CEICO)	Probing very weakly coupled Dark Matter with gravitational waves

20:00 Conference Dinner

7th of September 2022

9:00 – 9:30	Pyungwon Ko (Korea Institute for Advanced Study (KIAS))	Multi-component SIMP models
9:30 – 10:00	Nikolaos Tetradis (University of Athens)	Entanglement entropy in expanding backgrounds
10:00 – 10:30	Juan Garcia-Bellido (Universidad Autonoma de Madrid)	Covariant formulation of non-equilibrium thermodynamics in General Relativity: Cosmic Acceleration from First Principles
10:30 – 11:00	Joan Sola Peracaula (University of Barcelona)	Running Vacuum from QFT in curved spacetime and its implications on the sigma_8 and H_0 tensions
11:00 - 11:30	Coffee break	
11:30 - 12:00	David Wands (University of Portsmouth)	Large primordial density fluctuations from stochastic inflation
12:00 – 12:30	Fabio Scardigli (Politecnico Milano - Italy)	Bekenstein bound and uncertainty relations
12:30 – 13:00	Grigorios Patellis (NTU Athens)	Phenomenology of Supersymmetric Trinification from Dimensional Reduction of a N=1, 10D E_8 Theory

PoS(CORFU2021)362

13:00 – 13:30	Anish Ghoshal (INFN Tor Vergata, Rome, Italy)	Sky Meets Laboratory via Renormalization Group Equations: Higgs Inflation, Light Dark Sector and Gravitational Waves from Phase Transition
13:30 - 16:00	Lunch Break	
16:00 – 16:30	Rome Samanta (CEICO, IOP, PRAGUE)	Probing Leptogenesis with gravitational waves
16:30-17:00	Athanasios Bakopoulos (University of Ioannina)	Black-hole and wormhole solutions in Horndeski theories
17:00 - 17:30	Jorge Alfaro (Pontificia Universidad Cat. de Chile)	Axial Anomaly in Very Special Relativity
17:30 – 18:00	Yeongduk Kim	Double beta decay experiment - Focusing on AMoRE experiment
18:00 – 18:20	Coffee break	
18:20 – 18:50	Venus Keus (University of Helsinki)	CP-violating inflation and its cosmological imprints
18:50 – 19:20	Andreas Albert (Boston University (US))	DM in ATLAS and CMS
19:20 – 19:50	James Pinfold (University of Alberta)	MoEDAL- the LHC's First Experiment Dedicated to the Search for BSM Physics

8th of September 2022

09:00 - 09:30	Dmitry Kazakov (JINR)	Non-renormalizable Interactions
09:30 - 10:00	Ki-Young Choi (Sungkyunkwan University)	Sterile neutrino dark matter with dipole interaction
10:00 - 10:30	Oleg Lebedev (University of Helsinki)	The Higgs portal and an inflaton
10:30 - 11:00	Emilian Dudas (CPHT-Ecole Polytechnique)	Slow and safe gravitinos
11:00 - 11:30	Coffee break	
11:30 - 12:00	Arttu Rajantie ()Imperial College London	Monopoles and baryon number violation from heavy ion collisions
12:00 – 12:30	Giancarlo D'Ambrosio (INFN Sezione di Napoli)	Holographic determination of hadronic light by light contribution to the g-2
12:30 – 13:00	George Savvidy (Demokritos National Research Centre)	Gauge Field Theory Vacuum and Cosmological Inflation without Scalar Field

PoS(CORFU2021)362

13:00 - 16:00	Lunch break	
16:00 – 17:00	Luciano Musa (CERN)	Status report on ALICE
17:00 - 17:30	Larisa Bravina (University of Oslo)	Lambda and Antilambda polarization in heavy ion collision
17:30 – 17:55	Christos Kokorelis (American University of Malta)	The neutrino problem in models from string theory
17:55 – 18:25	Sonia Kabana (Universidad de Tarapaca, Arica, Chile)	Sexaquarks - an unexpected candidate for dark matter?

The ***Workshop on Celestial Amplitudes and Flat Space Holography*** attracted a total of 115 senior and young scientists; 21 of them presented their current research project as workshop speakers.

The full programme of the Workshop was the following:

30th of August 2022

2.00-2.40 pm	M. Paulos (Ecole Normale Superieure)	Conformal Bootstrap Review
2.40-3.20pm	M. Paulos (Ecole Normale Superieure)	Conformal Bootstrap Review
3.20-3.30pm	Coffee break	
3.30-4.10pm	T. Taylor (Northeastern U)	Single-valued celestial amplitudes
4.10-4.50pm	A-M. Raclariu (Perimeter Inst)	Conformal blocks and light-ray operators in celestial CFT
4.50-5.20pm	Coffee Break	
5.20-6.00pm	S. Pasterski (Princeton U)	Celestial Pyramids
6.00-8.00pm	Discussion	

31st of August 2022

2.00-2.40 pm	A. Sharma (U Oxford)	Taming distributional celestial amplitudes
2.40-3.20pm	K. Nguyen (King's College London)	Celestial IR divergences and the effective action of supertranslation modes
3.20-3.30pm	Coffee break	

PoS(CORFU2021)362

3.30-4.10pm	H. Jiang (Queen Mary U)	Holographic Chiral Algebra: Supersymmetry, Infinite Ward Identities, and Shadows
4.10-4.50pm	A. Guevara (Harvard U)	Celestial OPE blocks
4.50-5.20pm	Coffee Break	
5.20-6.00pm	A. Strominger (Harvard U)	w Infinity and the Celestial Sphere
6.00-8.00pm	Discussion	

1st of September 2022

2.00-2.40 pm	L. Mason (U Oxford)	Celestial twistor models and their w_{1+\infty} symmetry
2.40-3.20pm	S. He (Institute Theoretical Physics, CAS)	Comments on scattering equations
3.20-3.30pm	Coffee break	
3.30-4.10pm	H. Elvang (U Michigan, Ann Arbor)	Soft limits and the double copy
4.10-4.50pm	H. Elvang (U Michigan, Ann Arbor)	Soft limits and the double copy
4.50-5.20pm	Coffee Break	
5.20-6.00pm	T. Adamo (U Edinburgh)	Celestial OPEs from the worldsheet
6.00-8.00pm	Discussion	

2nd of September 2022

2.00-2.40 pm	M. Campiglia (Inst Fisica, Montevideo)	Asymptotic Symmetries in asymptotically flat spacetimes
2.40-3.20pm	M. Campiglia (Inst Fisica, Montevideo)	Asymptotic Symmetries in asymptotically flat spacetimes
3.20-3.30pm	Coffee break	
3.30-4.10pm	A. Laddha (Chennai Math Inst)	Soft Modes, Double Soft Theorems and BMS Algebra
4.10-4.50pm	M. Henneaux (U Libre Bruxelles& Intl Solvay Inst)	Analysis of asymptotic symmetries at spatial infinity
4.50-5.20pm	Coffee Break	
5.20-6.00pm	P. Mitra (U Cambridge)	Soft Exchange in Celestial CFT
6.00-8.00pm	Discussion	

PoS(CORFU2021)362

3rd of September

2.00-2.40 pm	S. Caron-Huot (McGill U)	Causality and Effective Theories
2.40-3.20pm	S. Caron-Huot (McGill U)	Causality and Effective Theories
3.20-3.30pm	Coffee break	
3.30-4.10pm	A. Sen (Harish-Chandra Research Inst)	Classical soft graviton theorem
4.10-4.50pm	Y-T. Huang (National Taiwan U)	Bulk locality on the celestial sphere
4.50-5.20pm	Coffee Break	
5.20-6.00pm	M. Pate (Harvard U)	Celestial Amplitudes from UV to IR
6.00-8.00pm	Discussion	

The ***Workshop on New Developments in Quantum Gravity and String Theory*** attracted a total of 80 senior and young scientists; 40 of them participated in person; 21 of them presented their current research project as workshop speakers.

The full programme of the Workshop was the following:

12th of September 2022

9:30 – 10:00	U. Lindstrom (Uppsala U)	Uses of Killing-Yano Tensors
10:00 – 10:30	E. Plauschinn (Utrecht U)	The tadpole conjecture at large complex-structure
10:30 – 11:00	E. Malek (Humboldt U)	Kaluza-Klein Spectrometry for String Theory Compactifi-cations
11:00 - 11:30	Coffee break	
11:30 - 12:00	I. Dalianis (NKUA)	Vacuum Structure of the N= 4 Conformal Supergravity
12:00 – 12:30	G. Tringas (NTUA)	From Type II to 3D flux vacua on G2 orientifolds
12:30 – 13:00	G. Karagiannis	Duality and higher Buscher rules in Gauge Theory and Gravity
13:30 - 16:00	Lunch break	
16:00 – 16:30	J. Sonner (Geneva U)	Ergodicity and Quantum Gravity

16:30-17:00	E. Palti (Ben-Gurion U)	Convexity of Charged Operators in CFTs and the Weak Gravity Conjecture
17:00 - 17:30	F. Farakos (Padua U)	Weak gravity, supergravity and de Sitter vacua
17:30 - 18:00	Coffee break	
18:00-18:30	C. Angelantonj (U Torino)	Quirks and Features of Brane Supersymmetry Breaking
18:30-19:00	H. Partouche (Ecole Polyt)	Wavefunction of the universe: Diffeomorphism invariance and field redefinitions

13th of September 2022

9:30 – 10:00	M. Petropoulos (Ecole Polyt, CPHT)	Asymptotics, holography and fluids
10:00 – 10:30	S. Ketov (Tokyo Met)	Formation of primordial black holes after inflation in supergravity
10:30 – 11:00	Y. Lozano (U Oviedo)	New advancements in AdS_3/CFT_2 and AdS_2/CFT_1
11:00 - 11:30	Coffee break	
11:30 - 12:00	A. Guarino (U Oviedo)	Flat deformations of type IIB S-folds
12:00 – 12:30	I. Basile (UMONS)	Supersymmetry breaking, brane dynamics and the swampland
12:30 – 13:00	D. Osten (ITMP Moscow)	Exceptional world-volume currents and their algebras
13:30 - 16:00	Lunch break	
16:00 – 16:30	E. Kiritsis (APC & U Crete	Emergent gravity from hidden sectors and TT deformations
16:30-17:00	T. Grimm (Utrecht U)	A Minimal Structure for the Landscape
17:00 - 17:30	A. Athenodorou (U Pisa and INFN)	Confining strings, axions and glueballs in the planar limit
17:30 - 18:00	Coffee break	
18:00-18:30	L. Martucci (U Padua)	The EFT stringy viewpoint on large distances
18:30-19:00	N. Petri (University of Oviedo)	Bubbles of nothing and AdS instabilities

14th of September 2022

PoS(CORFU2021)362

9:30 – 10:00	T. Van Riet (Leuven U)	The status of dS space in string theory (Review)
10:00 – 10:30		
10:30 – 11:00	A. Arvanitakis (Vrije Universiteit Brussel)	Homotopy algebras and "weak" double field theory beyond cubic level
11:00 - 11:30	Coffee break	
11:30 - 12:00	D. Kläwer (Mainz U)	Modular curves and the refined distance conjecture
12:00 – 12:30	A. Lukas (U Oxford)	Reinforcement Learning and String Model Building
12:30 – 13:00	R. De Mello Koch (SCN & Witwatersrand)	Quantum error correction and holographic information from bilocal holography
13:30 - 16:00	Lunch break	
16:00 – 16:30	R. Blumenhagen (MPI, Muenchen)	Quantum breaking in the high energy phase of QG
16:30-17:00	S. Lüst (Harvard U)	The tadpole problem
17:00 - 17:30	M. Montero (Harvard U)	The anomaly that was not meant IIB
17:30 - 18:00	Coffee break	
18:00-18:30	S. P. Mazloumi (Max Planck Institute for Physics)	Extracting Bigravity from String Theory

15th of September 2022

9:30 – 10:00	S. Reffert (ITP, U Bern)	New Developments in the Large Charge Expansion
10:00 – 10:30	N. Obers (NBI)	Torsional String Newton-Cartan Geometry for Non-Relativistic Strings
10:30 – 11:00	R. Minasian (Saclay, SPhT)	Higher-derivative couplings in string theory and F-theory at order α'^3
11:00 - 11:30	Coffee break	
11:30 - 12:00	D. Waldram (Imperial College London)	Stability, quotients and the moduli of 4d supersymmetric flux backgrounds
12:00 – 12:30	Fridrich Valach	Exceptional algebroids and Poisson-Lie U-duality
12:30 – 13:00	I. Kalogerakis (University of Bern)	The large quantum number expansion and resurgence

PoS(CORFU2021)362

13:30 - 16:00	Lunch break	
16:00 – 16:30	W. Lerche (CERN)	Fluxes, holomorphic anomalies and elliptic genera in four dimensions
16:30-17:00	I. Valenzuela (Harvard U)	Recent developments on the Swampland program (Review)
17:00 - 17:30	M. Emelin (Padua U)	Weak gravity vs charged massless gravitini in dS

16th of September 2022

9:30 – 10:00	O. Hohm (Humboldt University)	Higher algebras in physics (Review)
10:00 – 10:30	O. Hohm (Humboldt University)	Higher algebras in physics (Review)
10:30 – 11:00	C. S. Chu (NTHU)	Novel vacuum phenomena and boundary effects in string and field theory
11:00 - 11:30	Coffee break	
11:30 - 12:00	C. Hull (Imperial)	Non-Geometry and Duality
12:00 – 12:30	P. Schupp (Jacobs University, Bremen)	Interaction via deformation: graded geometry and gravity
12:30 – 13:00	M. Cederwall (Chalmers Univ. of Technology)	SL(5) supersymmetry
13:30 - 16:00	Lunch break	
16:00 – 16:30	C. Nunez (Swansea University)	Aspects of Gauge Strings Duality
16:30-17:00	B. Hoare (Durham University)	Yang-Baxter deformations of the Principal Chiral Model plus Wess-Zumino term
17:00 - 17:30	K. Zoubos (University of Pretoria)	Dynamical spin chains in N=2 superconformal gauge theories
17:30 - 18:00	Coffee break	
18:00-18:30	M. Dimitrijević-Ćirić (University of Belgrade)	L-infinity algebra and braided field theory
18:30-19:00	K. Morand (Sogang University)	On non-Riemannian geometries and singularities in Double Field Theory

17th of September 2022

PoS(CORFU2021)362

9:30 – 10:00	J. Rosseel (University of Vienna)	Nonrelativistic geometries for (super)gravity and strings (Review)
10:00 – 10:30	J. Rosseel (University of Vienna)	Nonrelativistic geometries for (super)gravity and strings (Review)
10:30 – 11:00	N. Cribiori (TU Wien)	De Sitter, the gravitino and the swampland
11:00 - 11:30	Coffee break	
11:30 - 12:00	E. Bergshoeff (University of Groningen)	Towards a NR Heterotic Superstring Theory
12:00 – 12:30	J. Lahnsteiner (University of Groningen)	Non-Relativistic Supergravity in Ten Dimensions
12:30 – 13:00	R. Marrotta (INFN- Naples)	Soft-theorems and gyromagnetic ratios

The ***Workshop on Quantum Features in a de Sitter Universe*** attracted a total of 35 senior and young scientists in person; 21 of them presented their current research project as workshop speakers.

The full programme of the Workshop was the following:

September 13th:
Arrival and welcome (evening)

September 14th:
Higher Spin theory in de Sitter. Morning (talk) R.L. Mkrtchyan.

Afternoon (discussion session) Y. Neiman

September 15th:
IR/late time effects in de Sitter. Morning (talk) M.S. Sloth (zoom).

September 16th:
de Sitter Holography. Morning (talk) D.M. Hofman.
Afternoon (discussion session) D. Galante.

September 17th:
Wavefunctionals/S-matrix techniques in de Sitter. Morning (talk) P. Benincasa.

September 18th:
the de Sitter group and Euclidean techniques. Morning (talk) C. Zukowski.
Afternoon (discussion session) V. Gorbenko + G. Sengor.

PoS(CORFU2021)362

PROCEEDINGS OF SCIENCE

September 19th: Departure

The ***Humboldt Kolleg on Quantum Gravity and Fundamental Interactions*** attracted a total of 135 senior and young scientists; 32 of them presented their current research project as workshop speakers.

The full programme of the Workshop was the following:

18th of September 2021

9:00-9:20	Greetings from G. Zoupanos and local representatives	
9:20 9:40	G. Zoupanos (NTUA)	A von Humboldt presentation
9:40 10:20	D. Luest (LMU & MPI, Munich)	The Gravitino and the Swampland
10:20 11:00	J. Kim (Seoul Natl. U.)	Black hole Information (remote)
11:00 11:40	A. Sagnotti (Scuola Normale Superiore)	String (In)Stability Issues with Broken Supersymmetry (remote)
11:40 12:00	Coffee break	
12:00 12:30	C. Markou (MPI Munich)	Extracting Bigravity from string amplitudes (remote)
12:30 13:00	I. Lavdas (LMU Munich)	Entanglement Islands, AdS Massive Gravity and Holography (remote)
13:00 13:40	R. Minasian (IPhT CEA-Saclay)	Anomalies as obstructions:from dimensional lifts to swampland
13:40 16:00	Lunch break	
16:00 16:40	S. Majid (Queen Mary University of London)	Quantum gravity on finite spacetimes (remote)
16:40 17:10	I. Garcia Garcia (KITP (UC Santa Barbara)	Bounce of Nothing (remote)
17:10 17:30	Coffee break	
17:30 18:10	G. Dvali (ASC Ludwig-Maximilians-Univ. and MPI Munich)	S-matrix constraints on landscape, and naturalness
18:10 18:50	A. Linde (Stanford University)	Inflation after Planck and BICEP (remote)

PoS(CORFU2021)362

18:50 19:30	R. Kallosh (Stanford University)	Sequestered inflation in M-theory and IIB string theory (remote)

19th of September 2021

9:00 9:40	H. Kawai (National Taiwan University)	Random geometry and naturalness (remote)
9:40 10:20	E. Pomoni (DESY)	Type-B Anomalies on the Higgs Branch (remote)
10:20 11:00	H. Nicolai (MPI, AEI, Postdam)	A perturbative expansion scheme for supermembrane and matrix (remote)
11:00 11:40	R. Szabo (Heriot-Watt University)	Braided Symmetries in Noncommutative Field Theory (remote)
11:40 12:00	Coffee break	
12:00 12:30	K. Krasnov (University of Nottingham)	Spin(10), octonions and the symmetry breaking (remote)
12:30 13:00	G. Savvidy (Demokritos National Research Centre)	Alternative Inflation Cosmology without Scalar Field
13:00 13:40	A. Ashtekar (Institute for Gravitation & the Cosmos, Penn State)	Alleviating tensions in the CMB using Planck scale physics. A Comic Tango between the very large and very small (remote)
13:40 16:00	Lunch break	
16:00 16:40	G. Ross (Oxford University)	R^2/Higgs inflation, gravitational contact terms and the hierarchy problem (remote)
16:40 17:10	M. Haack (LMU Munich)	Closed string disk amplitudes in the pure spinor formalism (remote)
17:10 17:30	Coffee break	
17:30 18:10	C. Hull (Imperial)	Gravity above the Planck Scale
18:10 18:50	Y. Oz (Tel Aviv University & SCGP)	Entanglement, Chaos and Quantum Computation(remote)

20th of September 2021

9:00 9:40	C. Bachas (ENS, Paris)	A far-from-equilibrium horizon
9:40 10:20	V. Rivasseau (Univ. Paris-Saclay)	Introduction to Tensorial Data Analysis
10:20 11:00	G. Barnich	Photons & Gravitons in a Casimir box

PoS(CORFU2021)362

11:00 11:40	C. Wetterich (Heidelberg university)	Pregeometry and emergent general (remote)
11:40 12:00	Coffee break	
12:00 12:30	K. Stelle (Imperial College, London)	Taxonomy of Brane Gravity Localisations (remote)
12:30 13:00	P. Nilles (Univ. Bonn)	High scale inflation, a window to quantum gravity (remote)
13:00 13:40	H. Steinacker (University of Vienna)	Gravity as a quantum effect on quantum space-time
13:40 16:00	Lunch break	
16:00 16:40	M. Martone (Simons Center for Geometry and Physics)	Characteristic dimension and isotrivial geometries (remote)
16:40 17:10	T. Weigand (Hamburg University)	Quantum Gravity Conjectures and their Geometric Manifestations (remote)
17:10 17:30	Coffee break	
17:30 18:10	H. Ooguri (Caltech & Kavli IPMU)	Completeness of Gauge Charges in Quantum Gravity (remote)
18:10 18:50	S. Giddings (UC Santa Barbara)	Black holes and clues

The ***Workshop on Quantum Geometry, Field Theory and Gravity*** attracted a total of 80 senior and young scientists; 40 of them participated in person; 64 of them presented their current research project as workshop speakers.

The full programme of the Workshop was the following:

21st September 2021

9:00 9:30	Buric Maja and Grosse Harald	Opening Tribute to John Madore
9:30 10:00	Karabali Dimitra (Lehman College, CUNY)	Entanglement entropy for integer Quantum Hall effect in two and higher dimensions
10:00 10:30	Nair Parameswaran (City College of the City University of New York)	Entanglement Entropy and Matter-gravity Couplings for Fuzzy Geometry
10:30 11:00	Hasebe Kazuki (Sendai NCT)	Quantum geometry in the lowest Landau level and higher Landau levels (remote)

PoS(CORFU2021)362

11:00 11:30	Coffee Break	
11:30 12:00	Iorio Alfredo (Charles University)	Towards the M=0 BTZ black hole in a lab
12:00 12:30	Calmet Xavier (University of Sussex)	Quantum gravity and the dark side of the universe (remote)
12:30 13:00	Wiseman Toby (Imperial College London)	Quantum black holes on the lattice (remote)
13:00 13:30	Floratos Emmanuel (NKUoA)	The Arithmetic geometry of AdS2 and its continuum limit
13:30 16:00	Lunch	
16:00 16:30	Tekel Juraj (Comenius University, Bratislava)	Fuzzy field theories in the string modes formalism
16:30 17:00	Vaidya Sachindeo (Indian Institute of Science, Bengaluru)	New Results in SU(N) Gauge Matrix Models (remote)
17:00 17:30	Coffee Break	
17:30 18: 00	Weber Thomas (University of Eastern Piedmont)	Noncommutative Levi-Civita connections on covariant spaces
18:00 18:30	Arnlind Joakim (Linköping University)	Levi-Civita connections for a class of noncommutative minimal surfaces (remote)
18:30 19:00	Morsella Gerardo (Tor Vergata University of Rome)	UV and IR finiteness on quantum spacetime through perturbative algebraic QFT and cosmology (remote)
19:00 19:30	Oriti Daniele (Arnold Sommerfeld Center for Theoretical Physics)	Quantum gravity states as tensor networks: entanglement and holography in spin networks
20:00 23:00	Welcome Reception	

22nd September 2021

9:00 9:30	Kulaxizi Manuela (Trinity College Dublin)	Conformal Correlators and Black Holes (remote)
9:30 10:00	Ramgoolam Sanjaye (Queen Mary University of London)	String theory random tensors and combinatoric constructability (remote)
10:00 10:30	Percacci Roberto (SISSA)	Higher-derivative and metric-affine gravity
10:30 11:00	Skvortsov Evgeny (UMONS and Lebedev Institute of Physics)	Integrable models from non-commutative geometry with applications to 3d dualities (remote)
11:00 11:30	Coffee Break	
11:30 12:00	Fukuma Masafumi (Kyoto University)	Numerical sign problem and the tempered Lefschetz thimble method (remote)

PoS(CORFU2021)362

12:00 12:30	Nishimura Jun (KEK)	Signature change of the emergent space-time in the IKKT matrix model (remote)
12:30 13:00	Tsuchiya Asato (Shizuoka University)	Target space entanglement in the matrix model for bubbling geometry (remote)
13:00 13:30	Asano Yuhma (University of Tsukuba)	Numerical simulation of real-time dynamics of Matrix Theory (remote)
13:30 16:00	Lunch	
16:00 16:30	Hoppe Jens (Technical University Braunschweig)	Recent progress on Membrane Theory (remote)
16:30 17:00	Klinkhamer Frans (KIT)	IIB matrix model bosonic master field and emergent spacetime (remote)
17:00 17:30	Coffee Break	
17:30 18:00	Hanada Masanori (University of Surrey)	Large-N limit as a second quantization
18:00 18:30	Penati Silvia (University of Milano-Bicocca)	Lines and defects in ABJM theory (remote)
18:30 19:00	Kupriyanov Vladislav (UFABC)	Poisson gauge theory (remote)
19:00 19:20	Lovrekovic Iva (TU Wien)_	Three-dimensional conformal higher spins and holography
20:00 0:30	Greek Night	

23rd September 2021

9:00 9:30	Sasakura Naoki (Yukawa Institute for Theoretical Physics, Kyoto University)	Emergence of classical spacetimes in canonical tensor model (remote)
9:30 10:00	van Suijlekom Walter (Radboud University Nijmegen)	Cyclic cocycles in the spectral action and one-loop corrections.
10:00 10:30	Martinetti Pierre (Univ. di Genova)	Standard model in noncommutative geometry Wick rotation and twisted spectral triples
10:30 11:00	Sitarz Andrzej (Jagiellonian University)	Spectral geometry and modifications of gravity
11:00 11:30	Coffee Break	
11:30 12:00	Wulkenhaar Raimar (WWU Muenster)	From scalar fields on noncommutative geometries to blobbed topological recursion (remote)
12:00 12:30	Schomerus Volker (DESY Theory Group)	Supergroup Chern-Simons Theory and Topological Phases (remote)
12:30 13:00	Castellani Leonardo (Univ.' del Piemonte Orientale and INFN,	Supergravity with integral forms (remote)

PoS(CORFU2021)362

	Torino Section)	
13:00 13:30	Chatzistavrakidis Athanasios (Rudjer Boskovic Institute)	Twisted R-Poisson Sigma Models
13:30 16:00	Lunch	
16:00 16:30	Platania Alessia (Perimeter Institute)	String Tension between de Sitter vacua and Curvature Corrections
16:30 17:00	Hebecker Arthur (Heidelberg U.)	Some recent issues in the quest for stringy de Sitter models (remote)
17:00 17:30	Buric Maja (University of Belgrade)	Fuzzy de Sitter and anti-de Sitter spaces (remote)
17:30 18:00	Coffee Break	
18:00 18:30	Giaccari Stefano (Holon Institute of Technology (HIT))	Moyal Yang Mills theory and higher spin in flat spacetime
18:30 19:00	Iazeolla Carlo (G. Marconi University, Rome and INFN Rome Tor Vergata)	Unfolding and higher-spins spacetime/fibre duality resolution of spacetime singularities and observables (remote)
19:00 19:30	Catterall Simon (Syracuse University)	Anomalies symmetric mass generation and staggered fermions (remote)

24th September 2021

9:00 9:30	Arzano Michele (University of Naples "Federico II")	Getting hot without accelerating vacuum thermal effects from conformal quantum mechanics
9:30 10:00	Landi Giovanni (UniversitÃ di Trieste)	Hopf algebroids and noncommutative gauge transformations
10:00 10:30	Fioresi Rita (University of Bologna)	Quantum Principal bundle and Non Commutative differential calculus
10:30 11:00	Watamura Satoshi (Tohoku University)	Metric algebroid in DFT (remote)
11:00 11:30	Coffee Break	
11:30 12:00	Jonke Larisa (Rudjer Boskovic Institute)	On Hopf and Lie-infinity algebras
12:00 12:30	Vysoky Jan (Czech Technical University)	Introduction to Graded Manifolds
12:30 13:00	Bonechi Francesco (INFN, Firenze)	Diagonalization of the Nijenhuis tensor from invariant polynomials
13:00 13:20	Manolakos Georgios (Rudjer Boskovic Institute)	A gravity model on a covariant 4-d noncommutative space
13:20 15:50	Lunch	
17:30 20:30	Boat Trip	

PoS(CORFU2021)362

PROCEEDINGS OF SCIENCE

25th September 2021

9:00 9:30	Wallet Jean-Christophe (IJCLab, Orsay)	Gauge Theories on kappa-Minkowski spaces. Results and prospects. (remote)
9:30 10:00	Meusburger Catherine (University of Erlangen-NÃ¼rnberg)	3d State sum models with defects (remote)
10:00 10:30	Sorokin Dimitr (INFN, Padova Section)i	ModMax electrodynamics its generalizations and applications
10:30 10:50	Hejda Filip (CEICO, Institute of Physics of the Czech Academy of Sciences, Czech Republic)	Generalised BSW effect and extraction of energy from extremal electrovacuum black holes
10:50 11:20	Coffee Break	
11:20 11:50	Lukierski Jerzy (Inst. Theor.-Physics, Wroclaw Univ.)	Spinorial Snyder Type Models from Superalgebras and Noncommutative (Phase)Superspaces (remote)
11:50 12:20	Lechtenfeld Olaf (Leibniz University Hannover)	The Nicolai map for supersymmetric Yang-Mills theory and application to the supermembrane
12:20 12:50	Cattaneo Alberto (University of Zurich)	The BFV formalism for Palatini-Cartan gravity and corner structure
12:50 13:20	Krajewski Thomas (Aix-Marseille Univ.)	A short glimpse into the loop vertex expansion (remote)
13:30 16:00	Lunch Break	
16:00 16:30	Kurkcuoglu Seckin (Middle East Technical University (METU))	Chaos in Matrix Gauge Theories with Massive Deformations (remote)
16:30 17:00	Bergner Georg (University of Jena)	Non-perturbative investigations of gauge theories with adjoint and fundamental matter related to supersymmetric gauge theories (remote)
17:00 17:30	Coffee Break	
17:30 18:00	Filev Veselin (Bulgarian Academy of Sciences)	Backreacted D0/D4 background (remote)
18:00 18:30	Giesel Kristina (FAU)	Reduced phase space quantisation in loop quantum gravity and loop quantum cosmology (remote)
18:30 18:50	Bhattacherjee Sandipan (Birla Institute of Technology Mesra, Ranchi, India)	Non-equilibrium Quantum Cosmology with a distinct hint of Condensed Matter Physics
18:50 19:20	Karczmarek Joanna (University of British Columbia)	Target space entanglement entropy matrix models and noncommutative geometry (remote)

PoS(CORFU2021)362

PROCEEDINGS OF SCIENCE

26th September 2021

9:10 9:30	Kovacik Samuel (UK Bratislava)	Microscopic black holes
9:30 10:00	Martin Carmelo Perez (UAM)	Unimodular supergravity (remote)
10:00 10:30	Ferrari Frank	On Jackiw-Teitelboim Quantum Gravity At Finite Cut-Off (remote)
10:30 11:00	Dobrev Vladimir (Bulgarian Academy of Sciences)	Heisenberg Parabolic Subgroups and Invariant Differential Operators (remote)
11:00 11:30	Coffee Break	
11:30 11:50	Morand Kevin (Sogang University, Seoul)	Graph complexes and deformation quantization of Lie bialgebroids (remote)
11:50 12:20	Fiore Gaetano (U Napoli Federico II)	Twisted submanifolds of R^n
12:20 12:50	Jurco Branislav (Charles U)	Homological Perturbation and Homotopy Transfer
12:50 13:20	Brzezinski Tomasz (Swansea U)	Heaps of connections (remote)
13:30 16:00	Lunch	
16:00 16:30	Toppan Francesco (CBPF)	Signatures of Z2xZ2-graded physics (remote)
16:30 17:00	Chryssomalakos Chryssomalis (UNAM)	Entanglement entropy in fuzzy R^3 (remote)
17:00 17:30	Coffee Break	
17:30 18:00	Freidel Laurent (Perimeter)	Local Holography a new paradigm for quantum gravity (remote)
18:00 18:30	Minic Djordje (Virginia Tech)	On quantum gravity and quantum gravity phenomenology in the infrared (remote)
18:30 19:00	Semenoff Gordon (U British Columbia)	Entanglement Harvesting or Crop Failure? (remote)
19:00 19:30	Van Raamsdoonk Mark	Cosmology from confinement

The ***School on Quantum Gravity Phenomenology in the Multi-Messenger Approach*** attracted a total of 80 senior and young scientists; 45 of them participated in person.

The full programme of the Workshop was the following:

PoS(CORFU2021)362

PROCEEDINGS OF SCIENCE

27th of September 2021

9:00-11:00	Illana José Ignacio (University of Granada0	Quantum field theory and the structure of the SM
11:00-11:30	Coffee Break	
11:30 – 13:30	Dorigo Tommaso (INFN - Sezione di Padova)	Statistics
13:30-16:00	Lunch Break	
16:00-18:00	Loll Renate (Radboud Univ. Nijmegen, IMAPP)	Introduction to fundamental concepts in quantum gravity
18:00 – 18:30	Coffee Break	
18:30 – 19:30	Tutorial	

28th of September 2021

9:00-11:00	Illana José Ignacio (University of Granada)	Quantum field theory and the structure of the SM
11:00-11:30	Coffee Break	
11:30 – 13:30	Dorigo Tommaso (INFN - Sezione di Padova)	Statistics
13:30-16:00	Lunch Break	
16:00-18:00	Calcagni Gianluca (IEM-CSIC)	Cosmology
18:00 – 18:30	Coffee Break	
18:30 – 19:30	Tutorial	

29th of September 2021

9:00-11:00	Loll Renate (Radboud University Nijmegen, IMAPP)	Introduction to fundamental concepts in quantum gravity
11:00-11:30	Coffee Break	
11:30 – 13:30	Calcagni Gianluca (IEM-CSIC)	Cosmology
13:30-16:00	Lunch Break	
16:00-18:00	Tutorial	

PoS(CORFU2021)362

18:00 – 18:30	Discussion	

30th of September 2021

Excursion

1st of October 2021

9:00-11:00	Spurio Maurizio (University of Bologna and INFN)	Astrophysical sources and acceleration mecha-nisms
11:00-11:30	Coffee Break	
11:30 – 13:30	Prandini Elisa (Padova University)	High-energy photons: propagation and detection
13:30-16:00	Lunch Break	
16:00-19:30	CA 18108 Presentations	

2nd of October 2021

9:00-11:00	Spurio Maurizio (University of Bologna and INFN)	Astrophysical sources and acceleration mecha-nisms
11:00-11:30	Coffee Break	
11:30 – 13:30	Boncioli Denise (University of L'Aquila and INFN-LNGS)	Cosmic rays: propagation and detection
13:30-16:00	Lunch Break	
16:00-18:00	Tutorial	
18:00 – 18:30	Coffee Break	
18:30 – 19:30	Students talks	

3rd of October 2021

9:00-11:00	Prandini Elisa (Padova University)	High-energy photons: propagation and detec-tion
11:00-11:30	Coffee Break	
11:30 – 13:30	Boncioli Denise (University of L'Aquila and INFN-LNGS)	Cosmic rays: propagation and detection
13:30-16:00	Lunch Break	

PoS(CORFU2021)362

16:00-18:00	Tutorial	
18:00 – 18:30	Discussion	

4th of October 2021

9:00-11:00	Kowalski-Glikman (University of Wroclaw)	Doubly special relativity and relative locality
11:00-11:30	Coffee Break	
11:30 – 13:30	Tórtola Mariam (IFIC (CSIC/Valencia University)	Neutrino physics
13:30-16:00	Lunch Break	
16:00-18:00	Tutorial	
18:00 – 18:30	Discussion	

5th of October 2021

9:00-11:00	Tórtola Mariam (IFIC (CSIC/Valencia University)	Neutrino physics
11:00-11:30	Coffee Break	
11:30 – 13:30	Kowalski-Glikman (University of Wrocław)	Doubly special relativity and relative locality
13:30-16:00	Lunch Break	
16:00-18:00	Tutorial	
18:00 – 18:30	Discussion	

The ***Workshop on Quantum Gravity Phenomenology in the Multi-Messenger Approach*** attracted a total of 80 senior and young scientists; 52 of them participated in person; 27 of them presented their current research project as workshop speakers.

The Workshop speakers were the following:

The full programme of the Workshop was the following:

PoS(CORFU2021)362

6th of October 2021

9.30-10.30	Opening	
10.30-11.00	Ioannisian Ara (YerPhI and ITPM)	Atmospheric neutrinos and CP violation
11.00-11.30	Coffee Break	
11.30-12.00	Satunin Petr (INR RAS)	Two-sided constraints on Lorentz Invariance violation from Tibet-ASγ and LHAASO Very-High-Energy photon observations
12.00-12.30-	Abedi Jahed (University of Stavanger)	Tentative evidence for echoes from GW190521
12.30-13.00	Dialektopoulos Konstantinos (Aristotle University of Thessaloniki)	Teleparallel analogue of Horndeski gravity
13.00-13.30	Pfeifer Christian (University of Bremen, ZARM)	Geometry of deformed relativistic kinematics on curved spacetimes
13.30-16.00	Lunch Break	
16.00-16.20	A. Reyes Hung Maykoll (Universidad de Zaragoza)	Effects of new physics in neutrino propagation
16.20-16.40	Frattulillo Domenico (Università di Napoli Federico II)	Planck scale deformed relativistic transformations in curved spacetime
16.40-17.00	Di Luca Maria Grazia (SSM)	Quantum gravity phenomenology with multi-satellite telescopes
17.00-17.20	Coffee Break	
17.20-17.50	Martínez Miravé Pablo (IFIC - CSIC-Universitat de Valencia)	Cosmological radiation density and neutrino non-standard interactions
17.50-18.20	Rastgoo Saeed (York University)	Non-perturbative quantization of gravitational waves, a model
18.20-18.50	Lobo Iarley (Federal University of Paraíba)	Finite Planck-scale-modified relativistic framework in Finsler geometry

7th of October 2021

9.30-10.30	Kerszberg Daniel (IFAE-BIST)	Probing Lorentz Invariance Violation with a combined analysis of H.E.S.S., MAGIC and VERITAS observations

PoS(CORFU2021)362

10.30-11.00	Rosati Giacomo (IFT Wroclaw University)	Testing curvature-induced in-vacuo dispersion with gamma-ray-bursts
11.00-11.30	Coffee Break	
11.30-12.00	Asorey Barreiro Jacobo (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas)	Testing cosmology with optical and radio surveys
12.00-12.30	Tokareva Anna (University of Jyväskylä)	Four-dimensional treatment of positivity bounds with gravity
12.30-13.00	Djodjevic Goran (Department of Physics, University of Nis)	Tachyon inflation in the holographic approach
13.00-16.30	Lunch Break	
16.30-16.50	Fabiano Giuseppe (University of Naples Federico II)	Modelling transverse relative locality at the Planck scale
16.50-17.20	Trimarelli Caterina (Università dell'Aquila - INFN-LNGS)	Constraining Lorentz Invariance Violation using the muon content of extensive air showers measured at Pierre Auger Observatory
17.20-17.40	Coffee Break	
17.40-18.10	Gutierrez Ivan (Universidad de Burgos)	The space of worldlines with κ-Poincaré symmetry
18.10-18.40	Staicova Denitsa (INRNE, BAS)	Testing Late Time Cosmic Acceleration with uncorrelated Baryon Acoustic Oscillations dataset

8th of October 2021

10.00-10.30	Heefer Sjors (Eindhoven University of Technology)	Randers pp-waves
10.30-11.00	Voicu Nicoleta (Transilvania University of Brasov)	Relativistic kinetic gases as direct sources of gravity
11.00-11.30	Coffee Break	
11.30-12.00	Gubitosi Giulia (U. Burgos)	Interplay between spacetime curvature, speed of light and quantum deformations of relativistic symmetries
12.00-12.30	Arzano Michele (University of Naples)	Decoherence and discrete symmetries in deformed relativistic kinematics
12.30-13.00	Ghazaryan Narine (YerPhI and ITPM)	Transition Radiation by Neutrinos
13.00-13.30	Saridakis Emmanuel (NTUA)	Gravitational wave signatures of torsional modified gravity
13.30-14.30	Amelino-Camelia Giovanni	QG phenomenology implications of LHAASO

PoS(CORFU2021)362

	(Università Federico II di Napoli)	and ICECUBE new data

Most of the presentations appeared on the CORFU2021 homepage shortly after they were delivered: http://www.physics.ntua.gr/corfu2021/lectures.html

We would like to sincerely thank everybody who contributed to the success of CORFU2021, especially the young students who came from far away from many different countries. We would like to offer our sincere thanks to all the speakers and the organizers, as well as to the conference secretary, Mrs. Ifigenia Moraiti. We also want to express our gratitude to the group of our graduate students who helped in various ways and contributed in a very significant manner to the success of the meeting. Finally, we wish to express our gratitude to our sponsors, whose financial contribution made it all possible.

They were:

1. COST: Action CA18108 - Quantum gravity phenomenology in the multi-messenger approach
2. COST: Action CA16201 - Unraveling new physics at the LHC through the precision frontier (supported by the EU Framework Programme Horizon 2020)
3. Alexander von Humboldt-Stiftung
4. National Technical University of Athens
5. School of Applied Mathematical and Physical Sciences (SAMPS)
6. Municipality of Corfu
7. University of Athens (NKUA)
8. Region of Ionian Islands
9. OTE: National Telecommunication Company
10. CERN
11. Deutsches Elektronen-Synchrotron (DESY)
12. Max Planck Institute for Physics
13. Max Planck Institute for Gravitational Physics (Albert Einstein Institute)
14. Sommerfeld Center for Theoretical Physics
15. National Center of Scientific Research “Demokritos”
16. Athens University
17. SISSA: Scuola Internazionale Superiore di Studi Avanzati
18. ICTP: The Abdus Salam International Centre for Theoretical Physics
19. IPPP Durham: Institute for Particle Physics Phenomenology

PoS(CORFU2021)362

20. LAPP: Laboratoire d'Annecy – le - Vieux de Physique des Particules
21. LAPTH: Laboratoire d'Annecy – le - Vieux de Physique Theorique
22. LPTENS: Laboratoire de physique théorique ENS
23. Universidad Autonoma de Madrid
24. Instituto de Fisica Teorica UAM/CSIC
25. Uppsala University
26. University of Warsaw
27. University of Granada
28. Technical University of Lisbon
29. IFIC Valencia
30. Oxford University
31. Universidad Autonoma de Madrid
32. Scuola Normale Superiore, Pisa
33. NCSR "Demokritos"
34. ITP Heidelberg
35. CPHT, Ecole Polytechnique
36. Queen Mary University of London
37. Rudjer Bošković Institute, Zagreb
38. Swansea University
39. Turin University
40. Ionian University
41. Ephorate of Antiquities of Corfu

PoS(CORFU2021)362

PROCEEDINGS OF SCIENCE

Nikolaos Mavromatos (NTU Athens)
Jun Nishimura (KEK & SOKENDAI, Tsukuba)
Margarida Nesbitt Rebelo (T.U. Lisbon)
Emmanuel Saridakis (N.O. Athens)
Harold Steinacker (Vienna U.)
Stephan Stieberger (LMU Munich)
Richard Szabo (Heriot-Watt University)
Patricia Vitale (U. Napoli & INFN)
Satoshi Watamura (Tokohu U.)
George Zoupanos (NTU Athens)

PoS(CORFU2021)362

