PROCEEDINGS OF SCIENCE

Foreword to the Proceedings of the Corfu Summer Institute "School and Workshops on Elementary Particle Physics and Gravity" (CORFU2015)

Dedicated to the memory of Guido Altarelli

where the world of physics mourns the loss
of a giant, a great teacher and friend
and the Corfu Summer Institute a strong
supporter of its vision and effort

1.Foreword

These are the Proceedings of the scientific activities of CORFU2015, the *15th Hellenic School and Workshops on Elementary Particle Physics and Gravity*, which took place from 1st to 27th September 2015. The School and Workshops were hosted by the European Institute for Sciences and their Applications (EISA) in the conference center of the ex-Royal Palace garden of Mon Repos in Corfu, Greece. The scientific activities took place during the series of four events, the *Summer School and Workshop on the Standard Model and Beyond*, the *Workshop on Particles and Cosmology*, the *Humboldt Kolleg on Open Problems in Theoretical Physics: the Issue of Quantum Space-Time* and the *Workshop on Noncommutative Field Theory and Gravity*.

We refer to the website:

http://www.physics.ntua.gr/corfu2015/

for all organizational and practical details.

These proceedings are dedicated to the memory of Professor Guido Altarelli, a great scientist, strong supporter of the Corfu meetings and personal friend of many of us, whose passing is indeed a great loss for us. From our hearts we send our deepest thoughts of sympathy and support to his family, loved ones and scientific collaborators. The feelings of many other friends and collaborators of Guido Altarelli can be found in the Guido Altarelli's Memorial Symposium, held at CERN on June 10th:

https://indico.cern.ch/event/493632/

organized by L. Alvarez-Gaumé, A. De Rújula, J. Ellis, E. Elsen, S. Ferrara, F. Gianotti, G. Giudice, P. Jenni, M. Mangano, M. Pepe Altarelli and G. Veneziano

with speakers: L. Maiani, G. Parisi, S. Forte, G. Martinelli, L. Di Lella, R.K. Ellis, R. Barbieri, G. Dissertori and I. Masina.

A phrase taken from the Guido Altarelli's Memorial Symposium certainly expresses the feelings of all the scientific community:

"The world of particle physics has lost a giant with the premature passing of Guido Altarelli. Internationally acclaimed for his pioneering research in QCD, weak interactions, precision tests of the Standard Model, neutrino physics and more, he was also universally appreciated for his mentoring of younger theorists and his close interactions with his experimental colleagues."

The Corfu Summer Institute has a very long, interesting and successful history. The Corfu Meeting started in 1982 as a Summer School on EPP mostly for Greek graduate students 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. In addition, it launched a very rich outreach program to teachers and school students that has been widely appreciated by the local society and scientific community over the years.

The structure of the “Summer Institute on EPP and Gravity 2015” was based on the general format developed and established and tested in all previous Corfu Meetings. This year was hosted again by the newly established European Institute for Science and their Applications. The new Institute aims to serve as permanent extension of the Corfu Summer Institutes with the additional target to attract first class scientists that can stay for a long period and produce locally a significant research output. The scientific activities of CORFU2015 were held in the conference hall of the garden of Mon Repos in the town of Corfu, which is expected to become the permanent basis of EISA.

As in previous events organized in Corfu, there was a number of European Research Networks, European Grants, Institutes and Universities that joined forces organizationally and contributed financial and human resources that led to the success of the Corfu Meetings.

The first event, ***Summer School and Workshop on the Standard Model and Beyond*** (took place from September 1th to September 11th 2015. It was organized and supported by ITN’s: HiggsTools, Invisibles, LHCPhenoNet, the ERC Grants: LHCtheory Theoretical Predictions and Analyses of LHC Physics: "Advancing the Precision Frontier", SUPERFIELDS, LHCTHEORY, HICCUP and the Institutes: Max Planck Institute for Physics, CERN, SAMPS - National Technical University of Athens, Deutsches Elektronen-Synchrotron (DESY), IPPP Durham, LAPP, IFT Madrid, Sommerfeld Center for Theoretical Physics, University of Uppsala SISSA, LPTENS, ICTP, LAPTH, University of Warsaw, University of Granada, Technical University of

Lisbon, IFIC Valencia, Oxford University, Universidad Autonoma de Madrid, Scuola Normale Superiore, Pisa, University of Uppsala, NCSR "Demokritos", University of Athens.

The Scientific Organizers were:

F. del Aguila (Granada U.)
I. Antoniadis (Ecole Polyt. & CERN)
R. Barbieri (SNS, Pisa)
M. B. Gavela (Autonoma U., Madrid)
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 (Dortmund U & CERN)
G. Zanderighi (CERN & Oxford U.)

The second event, ***Workshop on Particles and Cosmology***, took place from September 13rd to 19th 2015. It was supported by Transregional Collaborative Research Centre TRR 33 - The Dark Universe, Heidelberg University, University of Bonn, LMU Munich, SAMPS - National Technical University of Athens".

The Scientific Organizers were:

L. Amendola (U. Heidelberg)
S. Hofmann (LMU München)
J. Jaeckel (U. Heidelberg)
T. Reiprich (U. Bonn)
G. Wolschin (U. Heidelberg)
G. Zoupanos (NTUA)

The third event, ***Humboldt Kolleg Open Problems in Theoretical Physics: the Issue of Quantum Space-Time****,* took place from September 18th to 22th 2015. It was supported by the "Alexander von Humboldt-Stiftung/Foundation, Humboldt Kollegs".

The Scientific Organizers were:

K.N. Anagnostopoulos (NTUA)
P. Aschieri (U. Piemonte Orientale)
P. Vitale (INFN, Napoli)
G. Zoupanos (NTUA)

The fourth event, ***Workshop on Noncommutative Field Theory and Gravity****,* took place from September 21th to September 27th 2012. It was co-organized and partially supported by Courant Research Centre "Higher Order Structures in Mathematics", Goettingen, U. Catholique de Louvain, U. Athens, Universität Wien, U. Uppsala, U. Kyoto, Leibniz Universität Hannover, Riemann Center of Geometry and Physics, Sommerfeld Center, LMU & MPI, Munich, Heriot Watt University, CUNY, Lehman College, Università del Piemonte Orientale, INFN-Torino, INFN-Napoli, LPTENS, Universität Wien, Università di Napoli Federico II, CUNY - Lehman College, École Normale Supérieure, SAMPS - National Technical University of Athens

The Scientific Organizers were:

P. Aschieri (U. Piemonte Orientale)
D. Bahns (Math.Inst., Gottingen)
P. Bieliavsky (U. Cath. de Louvain)
E. Floratos (U. Athens)
H. Grosse (Vienna U.)
J. Iliopoulos (LPTENS)
D. Karabali (CUNY - Lehman)
H. Kawai (Kyoto U.)
O. Lechtenfeld (U. Hannover)
D. Lüst (ASC LMU and MPI, München)
A. Polychronakos (CUNY)
V. Rivasseau (LPT Orsay)
H. Steinacker (Vienna U.)
R.J. Szabo (Heriot-Watt)
S. Watamura (Tokohu U.)
P. Vitale (INFN, Napoli)
G. Zoupanos (NTUA)

The outcome was indeed very successful! An impressive element is that these consecutive events attracted about 274 senior and young scientists in total. The School lecturers were about 26 and the Workshop speakers about 110; whereas the young scientists were about 113. Internationally leading scientists have been gathered to participate to the School and Workshops, giving lectures and creating a rather unique and stimulating scientific environment for the senior as well as the young scientists.

More specifically, the ***Summer School and Workshop on the Standard Model and Beyond*** attracted 111 seniors and young scientist in total, 26 of them were invited school lecturers and 50 of them have presented their current research project as workshop speakers.

The invited review lecturers were the following:
I. Antoniadis, D. Autiero, T. Behnke, A. Blondel, G. Branco, M. Cirelli, L. Covi, J.P. Derendinger, J. Espinosa, S. Heinemeyer, W. Hollik, L. Fayard, E. Kiritsis, G. Lazarides, F. Lizzi, E. Ma, G. Martinelli, S. Pokorski, G. Ross, A. Starinets, D. Stockinger, G. Tonelli, E. Tsesmelis, F. Staub, F. Simon, G. Zanderighi,
and the workshop speakers:
A. Ali, P. Bandyopadhyay, M .Bures, F. Botella, F. Buccella, E.J. Chun, W. Chung , S. Dittmeier, I. Dorsner, C. Ecker, D. Emmanuel-Costa, T. Enomoto, J-M. Frere, D. Ghilencea, B. Grzadkowski, T. Hahn, S. Heinemeyer, W. Hollik, S.F. King, P. Ko, P. Koci, , S. Kabana, A. Karam, C. Kokorelis, M. Koratzinos, M. Krawczyk, Z. Lalak, F. Lizzi, S. Lola, , A. Manning, G. Marchiori, C. Markou, G. Martinelli, M. Martinez Perez, H.B. Nielsen, M. Olechowski, P. Osland, C. Pallis, G. Perez, M. Pierre, S. Pokorski, N. Rosa Agostinho, G. Ross, K. Sliwa, F. Staub, H. W. Themann, P. Tornambe, E. Tsesmelis, J. A. Yepes, G. Zanderighi.

The **full programme** of the School and Workshop was the following:

Tuesday Sept 1st
Arrival / Registration day

School lectures		
16:00 - 17:00	**D. Stockinger** (Dresden Tech U.)	Electroweak Standard Model 1
17:00 - 18:00	**G. Branco** (CFTP/IST, U. Lisboa)	Flavour Physics 1
18:00 - 18:20	Coffee break	
18:20 - 18:50	Discussion	
Workshop talks		
18:50 - 19:20	**M. Koratzinos** (Geneva U.)	The FCC-ee study
19:20 – 19:50	**P. Ko** (Korea IAS)	Towards EW scale DM with dark gauge symmetries

Wednesday Sept 2nd

School lectures		
9:00 – 10:00	**D. Stockinger** (Dresden Tech U.)	Electroweak Standard Model 2
10:00 - 11:00	**G. Branco** (CFTP/IST, U. Lisboa)	Flavour Physics 2
11:00 - 11:30		
11:30 - 12:30	**D. Stockinger** (Dresden Tech U.)	Electroweak Standard Model 3
12:30 - 13:30	**G. Tonelli** (CERN, INFN Pisa)	CMS - Physics Results
13:30 - 16:00	Lunch break	
16:00 - 17:00	**N. Harnew** (Oxford U.)	Physics highlights from LHCb
Workshop talks		
17:00 - 17:30	**A. Ali** (DESY)	Physics of Multiquark States
17:30-18:00	**S.F. King** (Southampton U.)	Unified Models of Neutrinos, Flavour and CP Violation
18:00 - 18:20	Coffee break	
18:20 - 18:50	Discussion	
18:50 - 19:20	**D. Emmanuel-Costa** (CFTP/IST, U. Lisboa)	SOSpin, a c++ tool for decomposition of SO(2N) spinorial representations
19:20-19:35	**N. Rosa Agostinho** (CFTP/IST, U. Lisboa)	A Novel Parametrization for Leptonic Mixing Matrix and CP Violation

Thursday Sept. 3rd

School lectures		
9:00 – 10:00	**S. Heinemeyer** (U. Cantabria)	Higgs theory: SM and SUSY 1
10:00 - 11:00	**W. Hollik** (MPI Munich)	Introduction to SUSY and MSSM 1
11:00 - 11:30		
11:30 - 12:30	**M. Cirelli** (Saclay, SPhT)	Dark Matter searches status as of 2015
12:30 - 13:30	**F. Staub** (CERN)	Introduction to SARAH and related tools
13:30 - 16:00	Lunch break	
16:00 - 17:00	**F. Simon** (MPI Munich)	CLIC: a multi TeV e+e- collider
Workshop talks		
17:00 - 17:30	**F. Buccella** (INFN)	Quantum statistical parton distribution function
17:30 – 18:00	**E.J. Chun** (Korea IAS)	Muon g-2 in Two Higgs Doublet Models
18:00 - 18:20	Coffee break	
18:20 - 18:50	Discussion	
18:50 - 19:20	**T. Hahn** (Munich, Max Planck Inst.)	Status of FeynHiggs
19:20 - 19:50	**F. Staub** (CERN)	Tutorial to SARAH

Friday Sept 4th

School lectures		
9:00 - 10:00	**W. Hollik** (MPI Munich)	Introduction to SUSY and MSSM 2
10:00 - 11:00	**S. Heinemeyer** (U. Cantabria)	Higgs theory: SM and SUSY 2
11:00 - 11:30	Coffee break	
11:30 - 12:30	**F. Lizzi** (INFN, Napoli)	Noncommutative geometry, spectral action and the Higgs
12:30 - 13:30	**S. Pokorski** (U. Warsaw)	Uncolored way beyond the SM
13:30 - 16:00	Lunch break	
16:00 - 17:00	**G. Zanderighi** (CERN and Oxford U.)	QCD 1
17:00 – 18:00	**E. Tsesmelis** (CERN and Oxford U.)	Future Accelerators at the High Energy Frontier
18:00 - 18:20	Coffee break	
18:20 - 18:50	Discussion	
Workshop and student's talks		
18:50 - 19:20	**B. Grzadkowski** (Warsaw U.)	A stable Higgs portal with vector dark matter
19:20-19:35	**P. Koci** (Masaryk U.)	Supersymmetry breaking from complex linear superfield
19:35-19:50	**P. Tornambe** (U. Freiburg)	Search for Supersimmetry in final states with two same sign leptons or three leptons and jets

Saturday Sept 5th

School lectures		
9:00 - 10:00	**G. Zanderighi** (CERN and Oxford U.)	QCD 2
10:00 - 11:00	**G. Ross** (Oxford U.)	BSM after LHC 8 TeV
11:00 - 11:30	Coffee break	
11:30 - 12:30	**G. Ross** (Oxford U.)	BSM after LHC 8 TeV
12:30 - 13:30	**I. Antoniadis** (École Polytechnique)	Introduction to Extra dimensions and Sting Phenomenology 1
13:30 - 16:00	Lunch break	
16:00 - 17:00	**I. Antoniadis** (École Polytechnique)	Introduction to Extra dimensions and Sting Phenomenology 2
Workshop talks		
17:00 – 17:30	**Z. Lalak** (Warsaw U.)	Stability of the Standard Model in the presence of gravity
17:30 – 18:00	**S. Lola** (U. Patras)	Flavour structure of R-Violating Operators and the LHC
18:00 - 18:20	Coffee break	
18:20 - 18:50	Discussion	
18:50 - 19:20	**G. Perez** (Weizmann Institute of Science)	Higgs and Flavor

19:20-19:35	**P. Bandyopadhyay** (INFN)	Higgs bosons: discovered and hidden, in extended supersymmetric standard models at the LHC
19:35-19:50	**C. Kokorelis** (NTUA & Greece Military Academy)	Gauge Unification from Split Supersymmetric String Models
19:50 - 20:05	**S. Dittmeier** (Heidelberg U.)	Readout via Flexprints for the Mu3e Experiment

Sunday Sept. 6th

Excursion

Monday Sept 7th

School lectures		
9:00 - 10:00	**G. Martinelli** (SISSA)	Unitarity fits: SM and search for New Physics
10:00 - 11:00	**E. Ma** (UC Riverside)	Neutrino theory 1: mass and interactions
11:00 - 11:30	Coffee break	
11:30 - 12:30	**E. Ma** (UC Riverside)	Neutrino theory 2: linkage and symmetries
12:30 - 13:30	**L. Fayard** (Orsay, LAL)	50 years of BEH boson search and the future 1
13:30 - 16:00	Lunch break	
16.00 - 17:00	**L. Fayard** (Orsay, LAL)	50 years of BEH boson search and the future 2
Workshop and student's talks		
17:00 - 17:30	**G. Martinelli** (SISSA)	Precision flavor physics with lattice QCD
17:30 - 18:00	**G. Ross** (Oxford U.)	Scanning as a solution to the hierarchy problem
18:00- 18:20	Coffee break	
18:20 - 18:50	Discussion	
Workshop talks		
18:50 - 19:30	**J-M. Frere** (U. Libre de	Are Neutrinos different?
19:30-19:45	**C. Markou** (LPTHE, UPMC)	The coupling of non-linear Supersymmetry to Supergravity
19:45 – 20:00	**A. Karam** (Ioannina U.)	Dark matter and neutrino masses from a scale-invariant multi-Higgs portal

Tuesday Sept 8th

School lectures		
9:00 - 10:00	**J. Espinosa** (IFAE & ICREA Barcelona)	Higgs Effective Field Theory
10:00 - 11:00	**J.P. Derendinger** (Bern U.)	SUSY/SUGRA 1
11:00 - 11:30	Coffee break	
11:30 - 12:30	J.P. Derendinger (Bern U.)	SUSY/SUGRA 2
Workshop and student's talks		
12:30 - 13:00	**G. Marchiori (LPNHE Paris)**	Higgs@ATLAS
13:00 - 13:30	**M. Olechowski** (University of Warsaw)	Neutralino blind spots in NMSSM with light singlet scalar

13:30 - 16:00	Lunch break	
16.00 - 16:30	**F. Botella** (U. Valencia/IFIC)	Flavour changing Higgs processes in some two Higgs doublet models
16:30 - 17:00	**Ghilencea** (IFIN-HH, Bucharest & CERN)	A manifestly scale-invariant regularization and quantum effective operators
17:30 - 18:00	**S. Kabana** (SUBATECH, Nantes)	Heavy Ion physics at RHIC and LHC
18:00- 18:20	Coffee break	
18:20 - 18:50	Discussion	

20.00 Greek Night

Wednesday Sept 9th

School lectures		
9:00 - 10:00	**E. Kiritsis** (Crete Center for Theoretical Physics)	Introduction to String Theory 1
10:00 - 11:00	**A. Starinets** (Oxford U.)	Introduction to Gauge/Gravity Duality and applications
11:00 - 11:30	Coffee break	
11:30 - 12:30	**A. Starinets** (Oxford U.)	Introduction to Gauge/Gravity Duality and
12:30 - 13:30	**E. Kiritsis** (Crete Center for Theoretical Physics)	Introduction to String Theory 2
13:30 - 16:00	Lunch break	
Workshop and student's talks		
16.00 - 16:30	**P. Osland** (Bergen U.)	CP Violation in the scalar sector
16:30 - 17:00	**K. Sliwa** (Tufts University)	Top physics in ATLAS
17:00 - 17:30	**M. Krawczyk** (Warsaw U.)	The Inert Dark Matter at the LHC
17:30 - 17:45	**T. Enomoto** (Osaka U.)	Limit on 2HDM with natural flavor conservation from flavor observables
17:45 - 18:00	**M. Pierre** (Orsay)	Dark matter in Z' extensions of the Standard Model
18:00- 18:20	Coffee break	
18:20 - 18:50	Discussion	
Workshop talks		
18:50 - 19:20	**W. Chung** (Institute for Basic Science, S. Korea)	CULTASK, The Coldest Axion Experiment at CAPP/IBS in Korea
19:20-19:35	**H. W. Themann** (Center for Axion and Precision Physics)	AXION Dark Matter Search at CAPP

Thursday Sept 10th

School lectures		
9:00 - 10:00	**A. Blondel** (U. Geneva)	Physics at the FCC
10:00 - 11:00	**T. Behnke** (DESY)	ILC

11:00 - 11:30	Coffee break	
11:30 - 12:30	**G. Lazarides** (Aristotle U., Thessaloniki)	Introduction to Cosmology 1
12:30 - 13:30	**L. Covi** (Gottingen U.)	Astroparticle Physics 1
13:30 - 16:00	Lunch break	
16.00 - 17:00	**D. Autiero** (Inst. Physique Nucleaire, Lyon)	Neutrinos (experimental)
Workshop and student's talks		
17:00 – 17:30	**M. Martinez Perez** (ICREA/IFAE-Barcelona)	Beyond-the-Standard-Model searches in ATLAS
17:30 - 18:00	**I. Dorsner** (U. Split, Croacia)	Scalar leptoquarks at LHC
18:00 - 18:20	Coffee break	
18:20 - 18:50	Discussion	
18:50 – 19:05	**M .Bures** (Masaryk U. Brno)	Stability and energy spectrum of the hydrogen atom in space with a compactified extra dimension and potential defined by Gauss' law
19:05-19:20	**J. A. Yepes** (Kavli Inst. for Theoretical Physics China)	Spin-1 resonance in a non--linear dynamical Higgs context
19:20 - 19:35	**A. Manning** (Sydney U.)	Baryogenesis as a Quantum Fluctuation

Friday Sept 11th

School lecture		
9:00 - 10:00	**G. Lazarides** (Aristotle U., Thessaloniki)	Introduction to Cosmology 2
Workshop and student's talks		
10:00 - 10:15	**C. Ecker** (TU Wien)	Holographic Entanglement Entropy from Numerical Relativity
10:15 - 10:30	**C. Pallis** (Valencia U.)	Observational Gravitational Waves from Kinetically Modified Non-Minimal Higgs Inflation
10:30 - 11:00	Coffee break	
School lecture		
11:00 - 12:00	**L. Covi** (Gottingen U.)	Astroparticle Physics 2
Workshop talks		
12:00 – 13:00	**H.B. Nielsen** (Niels Bohr Institute)	Prediction of some deviation in Higgs production and decay to gammas from pure Standard Model (due to bound state of 12 top-quarks)

Closing!

The ***Workshop on Particles and Cosmology*** attracted 84 senior and young scientists in total, and 30 of them have presented their current research project.
The workshop speakers were:
M. Bartelmann, D. Baumann, C. Boehm, S. Borgani, E. Bulbul, C. McCabe, C. – S. Chu, E. Copeland, J. Dunkley, H. Hoekstra, D. Luest, J. Mohr, K. Oda, W. Percival, V. Pettorino, A. Schmidt – May, M. Sullivan

The **full programme** of the Workshop was the following:

Sunday Sept 13th
Arrival / Registration day

Monday Sept 14th

9.15 – 9.30	Opening and Welcome: L. Amendola, G. Zoupanos, C. Wetterich	
9.30 -10.30	**D. Baumann** (U Cambridge)	From wires to cosmology
10.30 -11.00	Coffee Break	
11.00 -11.30	**K. Oda** (U Osaka)	Eternal Higgs inflation
11.30 -12.30	**D. Lüst** (LMU/MPP Munich)	Large N Graviton Scattering and Black Hole production
12.30 -16.00	Lunch Break	
16.00 -17.00	**M. Bartelmann** (U Heidelberg)	A microscopic approach to cosmic structure formation
17.00 -17.30	Coffee break	
17.30 -18.30	**S. Borgani** (INAF-AO Trieste)	Galaxy clusters and cosmology
18.30-19.00	**S. Salazar-Albornoz** (LMU/MPE Munich)	Clustering tomography on the final BOSS DR12 galaxy sample

Tuesday Sept 15th

9.00 – 9.45	**W. Percival** (ICG Portsmouth)	Baryon Acoustic Oscillation measurements
9.45 -10.30	**H. Hoekstra** (U Leiden/ Observatory)	Weak gravitational lensing by large-scale structure
10.30 -11.00	Coffee Break	
11.00 -12.00	**V. Pettorino** (U Heidelberg)	Overview of Planck 2015 results
12.00 -12.30	**M. Martinelli** (U Heidelberg)	Including birefringence into time evolution of CMB: Current and future constraints
12.30 -16.00	Lunch Break	
16.00 -16.30	**M. Maturi** (U Heidelberg)	The galaxy clusters project

16.30 – 17.00	**M. Carrasco** (U Heidelberg)	Predicting strong lensing regions in the sky
17.00 -17.45	**E. Bulbul** (SAO/ U Harvard)	Dark matter searches in the X-ray band and the 3.55 keV line
18.00 – 20.00	TR33_PI-Meeting	

Wednesday Sept 16th

9.00 – 9.45	**C. Boehm** (U Durham)	Dark matter interactions
9.45 -10.30	**C. McCabe** (U Amsterdam) Dark matter at the LHC	
10.30 -11.00	Coffee Break	

Excursion

Thursday Sept 17th

9.00 – 10.00	**M. Sullivan** (U Southampton)	Supernovae as cosmological probes
10.00 -10.30	**J. T. Nielsen** (NBI Copenhagen)	Calibratable standard candles
10.30 -11.00	Coffee Break	
11.00 -11.30	**M. Rau** (USM Munich)	Accurate photometric redshift probability density estimate
11.30 -12.30	**E. Copeland** (U Nottingham)	Dark Energy theory
12.30 -16.00	Lunch Break	
16.00 -16.30	**E. Giusarma** (U Rome/INFN)	Cosmological axion and neutrino mass constraints from Planck 2015 temperature and polarisation data
16.30 – 17.00	**J. Niklas Grieb** (MPE Munich)	Anisotropic Clustering Measurements using Fourier Space Wedges
17.00 -17.30	Coffee Break	
17.30 -18.15	**B. Dolan** (NUI Maynooth)	Black holes, Boyle's Law and the Quark-Gluon plasma
18.15 – 18.45	**H. Bech Nielsen** (NBI Copenhagen	

20.00 Greek Night

Friday Sept 18th

9.00 – 10.00	**A. Schmidt-May** (ETH Zuerich)	Modified Gravity: Nonlinear interactions for massive spin-2 fields
10.00 -10.30	**C. Arnold** (U Heidelberg)	Hydrodynamical simulations in f(R) gravity
10.30 -11.00	Coffee Break	
11.00 -11.30	**A. Platania** (U Catania)	Asymptotically safe inflation from

		quadratic gravity
11.30 -12.30	**E. Saridakis** (U Baylor)	Torsional modified gravity and cosmology
	C.-S. Chu (NTHU Taiwan)	IR effect in de Sitter space, screening of cosmological constant and inflation
12.30 -16.00	Lunch Break	
16.00 -16.30	**Y. Akrami** (U Heidelberg)	Bimetric gravity is safe – or good always defeats evil
16.30 – 17.30	**J. Mohr** (LMU Munich)	Cluster Cosmology with eROSITA on SRG
17.30	Farewell: End of Conference	

Saturday Sept 19th
Departure date

The ***Humboldt Kolleg Open Problems in Theoretical Physics: the Issue of Quantum Space-Time*** attracted 94 senior and young scientists in total, and 26 of them have presented their current research project.

The workshop speakers were:
C. Bachas, J. Belz, J. Ben Geloun, N. Bodendorfer, A. Chamseddine, A. Chatzistavrakidis, F. Correa, C. Dappiaggi, S. Doplicher, E. Dudas, I. Florakis, E. Ivanov, C. Kounnas, V. Lahoche, D. Luest, P. Minkowski, D. Oriti, M. Panero, A. Pinzul, G. Savvidy, A. Sitarz, H. Steinacker, K. Stelle, R. Szabo, I. Todorov, C. Wetterich

The **full programme** of the Workshop was the following:

Friday Sept 18th
Arrival Date

Saturday Sept 19th

9.00 – 9.30	**G. Zoupanos** **Dr. J. Belz** (Alexander von Humboldt Foundation)	Opening Greetings from the Humboldt Representative, Greetings from the local authorities
9.30 -10.20	**C. Wetterich** (ITP Heidelberg)	Scale Symmetry in Quantum Gravity
10.25 -11.15	**S. Doplicher** (Rome U.)	A quantum texture of spacetime and fields

11.20 -11.40	Coffee Break	
11.40 -12.30	**D. Luest** (ASC LMU and MPI, München)	Some aspect of gravity, quantum space and strings
12.35 -13.25	**D. Oriti** (AEI MPI, Potsdam)	Group field theory: a quantum field theory for the atoms of space
13.30 -16.30	Lunch Break	
16.30 -17.20	**E. Dudas** (Ecole Polytechnique, CPHT)	Aspects of nilpotent supergravity
17.25 -18.05	**N. Bodendorfer** (Warsaw U.)	Canonical loop quantum gravity: foundations and recent progress
18.10 -18.40	Coffee break	
18.40 -19.10	**I. Florakis** (CERN)	The universal structure of quantum corrections to gauge couplings in strings with broken supersymmetry
19.10 -19.40	**A. Pinzul** (U. Brasilia)	Spectral geometry approach to Horava-Lifshitz type theories: gravity and matter sectors in IR regime
19.40 – 20.10	**F. Correa** (Leibniz U.)	Hairy black holes and its microscopic entropy

Sunday Sept 20th

9.00 – 9.50	**R. Szabo** (Heriot-Watt U.)	Perspectives on Nonassociative Geometry
9.55 -10.45	**C. Bachas** (ENS, Paris)	On the moduli problem of string theory vacua
10.50 -11.20	Coffee Break	
11.20 -12.10	**G. Savvidy** (Demokritos)	Extension of Poincaré Group and of Yang-Mills theory. proton structure and tensor gluons
12.15 -13.05	**C. Dappiaggi** (Pavia U.)	An overview on algebraic quantum field theory on curved spacetimes
13.10 -15.30	Lunch Break	
15.30 -16.30	**J. Belz** (Alexander von Humboldt Foundation)	Presentation of the Humboldt activity to PhD students and young researchers
16.30 -17.20	**A. Chatzistavrakidis** (Leibniz U.)	T-duality without isometry via hidden gauge symmetries in 2D sigma models
17.25 -18.15	**I. Todorov** (Sofiya, Inst. Nucl. Res.)	New mathematical tools in perturbative quantum field theory
18.20 -18.50	Coffee break	
18.50 -19.20	**M. Panero** (U. Turin & INFN, Turin)	The numerical approach to quantum field theory in a noncommutative space
19.20-20.00	**E. Ivanov** (BLTP, JINR, Dubna)	On-shell N=(1,1) 6D-harmonic

		superspace and its applications

Monday Sept 22th

9.00 – 9.50	**A. Chamseddine** (American U. of Beirut)	Quanta of Geometry: Basics and Applications
9.55 -10.45	**J. Bengeloun** (AEI MPI, Potsdam)	Renormalization in tensorial group field theory
10.50 -11.20	Coffee Break	
11.20 -12.10	**H. Steinacker** (U. Vienna)	Matrix model description of gauge theory and gravity
12.15 -13.05	**P. Minkowski** (AEC-ITP, Bern U.)	The notion of Heraklitean spacetime
13.10 -16.30	Lunch Break	
16.30 -17.20	**K. Stelle** (Imperial College)	Gravity Localisation on Braneworlds
17:25 -18:15	**A. Sitarz** (Jagiellonian U.)	Metrics on Noncommutative Spaces and the Moyal Sphere
18:20 -18:50	Coffee break	
18:50 -19:20	**V. Lahoche** (U. Paris-Sud)	Renormalization of an Abelian Tensor Group Field Theory
19:20 -20:10	**C. Kounnas** (ENS, Paris)	Stringy N = 1 Super no Scale Models

The ***Workshop on Noncommutative Field Theory and Gravity*** attracted 71 senior and young scientists in total, and 32 of them presented their current research project.

The workshop speakers were:

P. Aschieri, I. Bakas, G. E. Barnes, J. Barrett, D. Blaschke, A. Borowiec, L. Dabrowski, V. Dobrev, M. Dobrski, L. Glaser, M. Hanada, L. Jonke, J. Iliopoulos, G. Ishiki, T. Krajewski, V. Kupriyanov, J. Lewandowski, F. Lizzi, C. P. Martin, C. Meusburger, D. O'Connor, S. Ramgoolam, V. Rivasseau, M. Sakellariadou, P. Schupp, J. Tekel, F. Toppan, A. Tsuchiya, J. You, E. Vagenas, R. Wulkenhaar

The **full programme** of the Workshop was the following:

Tuesday Sept 22th

09.00-09.05	**Welcome**	
09.05-09:55	**P. Schupp** (Jacobs U. Bremen)	Aspects of NCG in string theory I
09:55-10.45	**P. Schupp** (Jacobs U. Bremen)	Aspects of NCG in string theory II
10:45-11.15	Coffee Break	
11.15-12.05	**I. Bakas** (NTUA)	Aspects of NCG in string theory III
12.05-12.45	**F. Lizzi**, (Universlty of Napoli)	Planck's Inconstant

12:45-13:15	**L. Dabrowski** (SISSA)	The Standard Model in Noncommutative Geometry and Morita equivalence
13.15-16.00	Lunch Break	
16.00-16.40	**J. Barrett** (Nottingham U.)	Quantum non-commutative geometry
16.40-17.10	**V. Dobrev** (Bulgarian Academy of Sciences)	Invariant Differential Operators in Noncommutative Quantum Group Setting
17.10-17.40	Coffee Break	
17:40-18:10	**D. O'Connor** (DIAS Dublin)	Membrane Matrix models and non-perturbative checks of AdS/CFT
18:10-18:30	**J. Tekel** (Comenius University, Bratislava)	The phase diagram of the scalar field theory on the fuzzy sphere and the multi trace matrix models
18:30-18:50	**L. Jonke** (Rudjer Boskovic Institute)	Sigma models for genuinely non-geometric backgrounds
	Scientific Discussion	

Wednesday Sept 23th

09.00-09.50:	**P. Aschieri** (U. Piemonte Orientale Alessandria	Aspects of NC field theory I
09.50-10.40	**P. Aschieri** (U. Piemonte Orientale Alessandria	Aspects of NC field theory II
10.40-11.10	Coffee Break	
11.10-12.00	**M. Hanada** (Kyoto U.)	Matrix models I
12.00-12.40	**A. Tsuchiya** (Shizuoka U.)	Exponential and power-law expansion of the Universe from the type IIB matrix model
12.40-15.30	Lunch Break	
15:30-15:50	**E. Vagenas** (Kuwait University)	Semiclassical corrections to black hole entropy and the generalized uncertainty principle
15:50-16:20	**G. Ishiki** (KEK)	
16.20-16.50	Coffee	
17:00-18:00	Scientific Discussion	
18:00	QSPACE WG3 meeting	
20:00	Greek Night	

Thursday Sept 24th

09.00-09:50	**M. Hanada** (Kyoto U.)	Matrix models II
09.50-10.40	**D. Blaschke** (Los Alamos National Laboratory)	Aspects of NC field theory III
10.40-11.10	Coffee Break	
11.10-12.00	**V. Rivasseau** (U. Paris XI, Orsay)	Tensor Field Theory I

12.00-12.40	**J. Lewandowski** (Uniwersytet Warszawski)	Non-commutative structure of spacetime from classical general relativity
12:40-13:00	**M. Sakellariadou** (King's College London)	
	Free Afternoon/Guided Tour	

Friday Sep 25th

09.00-09.50	**S. Ramgoolam** (Queen Mary U.)	Combinatorics of large N gauge theories, I
09:50-10.40	**S. Ramgoolam** (Queen Mary U.)	Combinatorics of large N gauge theories, II
10.40-11.10	Coffee Break	
11:10-12.00	**V. Rivasseau** (U. Paris XI, Orsay)	Tensor Field Theory II
12:00-12:40	**T. Krajewski** (CPT Marseille)	Power counting and scaling for tensor models
12.40-16.00	Lunch Break	
16.00-16.40	**R. Wulkenhaar** (U. of Münster)	A solvable quantum field theory in 4 dimensions
16:40-17:00	**C. P. Martin** (Universidad Complutense de Madrid)	UV Quantum corrections in Unimodular Gravity
17.00-17.30	Coffee Break	
17:30-18:00	**J. You** (Institute Rudjer Boskovic)	Tadpole contribution to the noncommutative photon self-energy
18.00-18.30	**A. Borowiec** (Wroclaw University)	Extended kappa-deformations and extended kappa-Minkowski spacetimes
18:30-18:50	**F. Toppan** (CBPF)	Conformal Galilei Algebras and invariant PDEs cryptohermiticity and deformations

Discussion

Saturday Sep 26th

09:00-09:40	**C. Meusburger** (U. of Erlangen)	Hopf algebra gauge theory and Kitaev lattice models
09:40-10:00	**G. E. Barnes** (Heriot-Watt University)	Nonassociative geometry in the representation category of a quasi-Hopf algebra
10.00-10.20	**V. Kupriyanov** (UFABC)	Nonassociative Weyl star products
10.20-10.40	**L. Glaser** (Nottingham University)	Monte Carlo simulations of fuzzy space
10.40-11.10	Coffee Break	
11:10-11:30	**M. Dobrski** (Lodz University of Technology)	Fedosov quantization and noncommutative gravity
11:30-12:10	**J. Iliopoulos** (LPTENS)	Gauge theories and non-commutative geometry
	Discussion	

Sunday Sep 27th
Departure Date

Most of the presentations appeared on line in the CORFU2015 homepage just after they were delivered: http://www.physics.ntua.gr/corfu2015/lectures.html We sincerely thank everybody who contributed to the success of CORFU2015, in particular the young students that came long ways from many different countries. Special thanks are due to all speakers and the organizers, the conference secretary Mrs. Ifigenia Moraiti and 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.

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5. National Technical University of Athens
6. School of Applied Mathematical and Physical Sciences, National Tech. U. of Athens
7. Municipality of Corfu
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
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
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40. Heriot Watt University
41. CUNY
42. Lehman College
43. Università del Piemonte Orientale
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