



Capacities/Research Potential
FP7-REGPOT-2009-1

Project No. 228644

CRETEHEPCOSMO

Crete Center for particle Physics and Cosmology

Deliverable D7

Conference announcement on the website, presentations posted at website and report.

Project start date:	01/04/2009
Project duration:	41 months
Due date of deliverable:	33rd month
Actual submission date:	40th month
Dissemination level:	PU

There reports for three meetings here:

The first is the standard workshop that was proposed in the Annex. Its date was moved from convenience from the 33rd month to the 39th month, in order to maximize impact and to ensure that an appropriate evolution in the field was available.

The two others were funded partly from CreteHEPCosmo, since there were leftover funds from the conference budget, and after permission was obtained from the EU coordinating officer.

One was held in Milos, Greece, and was organized in tandem with our Israeli partners. The other was an advanced school and was organized in Naxos, in tandem with our collaborators from Athens and the Potsdam groups.

REPORT

GRAVITY THEORIES AND THEIR AVATARS

CRETE CENTER FOR THEORETICAL PHYSICS
HERAKLION, CRETE

JULY 13 – 19, 2012

THEME TITLE: FP7-REGPOT-2008-1

Project acronym: Crete-HEP-Cosmo

Project full title: Crete Center for Particle Physics and Cosmology

Grant Agreement No: 228644

- **SCIENTIFIC PROGRAM/TALKS:** According to the format of the Workshop we had two review talks (one in the morning, one in the

afternoon) on subjects of current interest, followed by a session of questions and discussion. During lunch, dinner, coffee breaks and the time between the morning and afternoon talks one had the opportunity for extensive discussions with the speakers and interaction with the rest of the participants. Only one day was left free.

- **ELECTRONIC PROCEEDINGS:** The slides or transparencies of all talks have been posted in the [program webpage](#)

Thursday 12 July

08:00 - 20:00 Arrivals

Friday 13 July

10:30 - 11:00 Welcome and Opening
Morning Session Chairman: E. Kiritsis

11:00 - 12:15 M. Gaberdiel Minimal Model Holography
(ETH)

12:15 - 13:00 Discussion

13:00 - 15:30 Lunch

15:30 - 16:00 Coffee and cookies
Afternoon Session Chairman: E. Kiritsis

16:00 - 17:15 J. Erdmenger Universality or non-universality in applications of
(Max Planck Institut, Munchen) gauge/gravity duality

17:15 - 18:00 Discussion

Saturday 14 July

10:30 - 11:00 Coffee and cookies
Morning Session Chairman: V. Niarchos

11:00 - 12:15 C. Hoyos Odd transport in holography
(Tel Aviv University)

12:15 - 13:00 Discussion

13:00 - 15:30 Lunch

15:30 - 16:00 Coffee and cookies
Afternoon Session Chairman: V. Niarchos

16:00 - 17:15 R. Janik Numerical relativity and non-equilibrium plasma
(Jagiellonian U)

17:15 - 18:00 Discussion

Sunday 15 July

08:00 - 20:00 Free Day

Monday 16 July

10:30 - 11:00 Coffee and cookies
Morning Session Chairman: E. Kiritsis

11:00 - 12:15 S.J. Rey Is AdS₄/CFT₃ a repetition of AdS₅/CFT₄?
(Seoul National University)

12:15 - 13:00 Discussion

13:00 - 15:30 Lunch

15:30 - 16:00 Coffee and cookies
Afternoon Session Chairman: T. Tomaras

16:00 - 17:15 C. Bachas Rational (quasi)duality groups
(ENS Paris)

17:15 - 18:00 Discussion

Tuesday 17 July

10:30 - 11:00		Coffee and cookies
		Morning Session Chairman: E. Kiritsis
11:00 - 12:15	S. Gubser (Princeton)	Non-fermi liquids from D-brane constructions
12:15 - 13:00		Discussion
13:00 - 15:30		Lunch
15:30 - 16:00		Coffee and cookies
		Afternoon Session Chairman: V. Niarchos
16:00 - 17:15	T. Takayanagi (Kyoto University)	Holographic Entanglement Entropy: from Condensed Matter to Emergent Spacetime
17:15 - 18:00		Discussion

Wednesday 18 July

10:30 - 11:00		Coffee and cookies
		Morning Session Chairman: V. Niarchos
11:00 - 12:15	K. Skenderis (Amsterdam)	Lifshitz as a deformation of Anti-de Sitter
12:15 - 13:00		Discussion
13:00 - 15:30		Lunch
15:30 - 16:00		Coffee and cookies
		Afternoon Session Chairman: T. Petkou
16:00 - 17:15	G. Horowitz (Santa Barbara)	Instability of Anti-de Sitter Spacetime
17:15 - 18:00		Discussion
20:00		Workshop Banquet - Merastri Restaurant

Thursday 19 July

10:30 - 11:00		Coffee and cookies
		Morning Session Chairman: N. Toumbas
11:00 - 12:15	D. Tong (Cambridge)	Holographic Optical Conductivity
12:15 - 13:00		Discussion
13:00 - 15:30		Lunch
15:30 - 16:00		Coffee and cookies
		Afternoon Session Chairman: V. Niarchos
16:00 - 17:15	J. Gauntlett (Imperial)	Holographic Superfluids and the Dynamics of Symmetry Breaking
17:15 - 18:00		Discussion

Friday 20 July

Departures

- **IMPACT ON THE CENTER**

The impact of the workshop «Gravity theories and their avatars» on the CCTP was multifold. Members of the Center came in close and extensive contact with top researchers and topics of intense current interest on the subject of the workshop. This will allow them to further their research, provide important visibility to the Center, its staff and other members, and in the long-run advance the status of the Center on the European research map.

On the scientific side, the topics presented in the workshop were mostly centered around the subject of gauge-gravity dualities: the fundamental principles underlying their structure and their applications to physical problems in high energy and condensed matter physics. More specifically, the topics that were covered include:

(i) Applications of Holographic methods to the study of strongly coupled systems. Such methods, based on what is called the AdS/CFT correspondence have been applied to the study of formal properties of String Theory and $N=4$ Super Yang-Mills gauge theory, as well as the behavior of Quantum Chromodynamics, especially in relation to the Quark-Gluon plasma, a popular application which comes under the name AdS/QCD or Gauge/Gravity correspondence. During the last few years this approach has attracted a lot of attention and is being applied to Condensed Matter Theory (CMT) in an effort to shed light and understand interesting phenomena taking place in “down to earth” material systems. So, this topic is very broad and lies at the heart of scientific interests of several members of the CCTP. All aspects and applications of the general approach were extensively presented and discussed by many speakers of the Workshop. Specifically, several talks were devoted to applications of these methods to Quantum Chromodynamics, hydrodynamics, transport properties in strongly couple systems, non-equilibrium properties, non-Fermi liquids, superconductivity and superfluidity, entanglement entropy and the Quantum Hall effect.

(ii) The conceptual underpinnings and fundamental principles behind the AdS/CFT correspondence, also among the interests of a few members of the Center, were the subject of several talks in the workshop. Of particular interest was the study of low-dimensional examples of the AdS/CFT correspondence that involves two- and three-dimensional conformal field theories. In this context the relation to between two-dimensional conformal field theories and three-dimensional higher-spin field theories on AdS was discussed.

(iii) Finally, other topics such as new rational duality symmetries in string theory, gauge-gravity dualities with non-AdS Lifshitz asymptotics and a new type of instability in Anti-de Sitter spacetimes were discussed offering new insights into fundamental issues related to the properties of string theory and general theories of gravity, the main theme of the workshop.

The members of the Center actively participated in discussions, both during the talks and in private, with the visiting scientists focusing primarily on the topics of their own research. The junior members of the Center had similar extensive contacts.

- **ADVERTISEMENT:** The Conference was announced and advertised in many ways:

- (i) On the website of the Center: <http://hep.physics.uoc.gr/workshop2012/>
- (ii) On the InspireHep website <http://inspirehep.net/record/1085452?ln=en>, and other conference announcement sites.
- (iii) Via emails to worldwide scientists and research groups relevant to the subject.

- **WORKSHOP EXPENSES**

Expenses	Amount
Travel and Accommodation expenses	17,739.14
Coeffe-breaks, Banquet	3,343.50
TOTAL	21.082,64

The following scientists were supported with Travel and Accommodation expenses:

1. Bachas Constantin (LPT, Ecole Normale, Paris)
2. Erdmenger Johanna (Max Planck Institut fuer Physik)
3. Gaberdiel Matthias (ETH Zurich)
4. Gauntlett Jerome (Imperial College)
5. Goutéraux Blaise (APC, Univ. Paris Diderot)
6. Gubser Steven (Princeton University)
7. Gursoy Umut (CERN)
8. Horowitz Gary (UC santa Barbara)
9. Hoyos Carlos (Tel Aviv University)
10. Janik Romuald (Jagiellonian University)
11. Papageorgakis Constantinos (Rutgers University)
12. Pomoni Elli (Humboldt-Universität zu Berlin)
13. Rey Soo-Jong (Seoul National University)
14. Skenderis Kostas (University of Amsterdam)
15. Takayanagi Tadashi (Yukawa Institute for Theoretical Physics, Kyoto University)
16. Taylor Marika (University of Amsterdam)
17. Tong David (University of Cambridge)
18. Zoakos Dimitrios (University of Porto)

- **CONCLUSIONS:** The scientific conclusions of the Conference may be briefly summarized as follows: (a) The AdS/CFT conjecture and the new methods it inspires have been extended, appropriately modified and used recently to the study of open problems in a wide variety of fields including off-equilibrium hydrodynamics, transport properties in strongly coupled systems, non-Fermi liquids, superconductivity and superfluidity, entanglement entropy, the Quantum Hall effect, and the

quark-gluon plasma phase of Quantum Chromodynamics (QCD). Interesting conclusions and several in principle testable predictions about the behavior of such as well as other exotic systems have been drawn. It is becoming more and more clear that these holographic techniques will continue to play an important role in physics. So, experts (among which several members of our group) are encouraged to extend these ideas and intensify their efforts to further improve the applicability of this approach. (b) The underlying principles behind the AdS/CFT correspondence and their implications for fundamental theory are not yet fully explained but significant recent progress has been achieved. A new set of dualities between two-dimensional conformal field theories and three-dimensional higher-spin theories on AdS have been proposed and non-trivially tested leading to a new paradigm of gauge-gravity duality. New examples of the AdS/CFT correspondence for two-, three-, and four-dimensional CFTs are now starting to yield a more global understanding of the basic properties of the holographic duality. (c) It was also interesting to hear about other progress in string theory and General Relativity. The development of a more general framework of duality symmetry groups in string theory was reported as well as a new type of gravitational instabilities in Anti-de Sitter space-times.

- **ORGANIZATION/PARTICIPANTS:** The scientific committee and the local organizing committee may be found on the conference website <http://hep.physics.uoc.gr/workshop2012/>. The total number of invited participants was 51. Of those 13 were local researchers, members of our Crete Center for Theoretical Physics (CCTP). The remaining 38 came from essentially all countries of Europe, America and the Far East.

List of Foreign Participants

1. Alishahiha Mohsen (IPM, Iran)
2. Arean Daniel (ICTP)
3. Bachas Constantin (LPT, Ecole Normale, Paris)
4. Bigazzi Francesco (Firenze U. and INFN Pisa)
5. Bolokhov Pavel (University of Minnesota)
6. Cotrone Aldo Lorenzo (University of Turin)
7. Donos Aristomenis (Imperial College London)
8. Erdmenger Johanna (Max Planck Institut fuer Physik)
9. Filev Veselin (Dublin Institute for Advanced Studies)
10. Gaberdiel Matthias (ETH Zurich)
11. Garcia-Zenteno Antonio (ICN-UNAM)
12. Gauntlett Jerome (Imperial College)
13. Giataganas Dimitri (University of Witwatersrand)
14. Goutéraux Blaise (APC, Univ. Paris Diderot)
15. Gubser Steven (Princeton University)
16. Gursoy Umut (CERN)
17. Horowitz Gary (UC Santa Barbara)
18. Hoyos Carlos (Tel Aviv University)
19. Janik Romuald (Jagiellonian University)

20. Kaplis Nikolaos (University of Oxford)
21. Mas Javier (Universidad de Santiago de Compostela)
22. Miao Shun-Pei (University of Utrecht)
23. Nitti Francesco (APC, Universite Paris 7)
24. O'Bannon Andrew (DAMTP, Cambridge)
25. Papadimitriou Ioannis (Institute of Theoretical Physics CSIC/UAM, Madrid)
26. Papageorgakis Constantinos (Rutgers University)
27. Pilch Krzysztof (University of Southern California)
28. Pomoni Elli (Humboldt-Universität zu Berlin)
29. Rey Soo-Jong (Seoul National University)
30. Siampos Konstadinos (CPHT, Ecole Polytechnique)
31. Skenderis Kostas (University of Amsterdam)
32. Takayanagi Tadashi (Yukawa Institute for Theoretical Physics, Kyoto University)
33. Taylor Marika (University of Amsterdam)
34. Tong David (University of Cambridge)
35. Toumbas Nicolaos (University of Cyprus)
36. Woodard Richard P (University of Florida)
37. Xiaoning Wu (Institute of Mathematics, AMSS, CAS)
38. Zoakos Dimitrios (University of Porto)

List of Local Participants

1. Ioannis Iatrakis (University of Crete)
2. Matti Jarvinen (University of Crete)
3. Elias Kiritsis (University of Crete)
4. Ioannis Konstantinou (University of Crete)
5. Matthew Lippert (University of Crete)
6. Rene Meyer (University of Crete)
7. Vasilis Niarchos (University of Crete)
8. Tassos Petkou (University of Crete)
9. Maria Romania (University of Crete)
10. Anastasios Taliotis (University of Crete)
11. Theodore Tomaras (University of Crete)
12. Nicolas Tsamis (University of Crete)
13. Hong Bao Zhang (University of Crete)
14. Nikos Papanicolaou
15. Petros Ditsas
16. George Grammatikakis
17. Xenophon Zotos
18. Petros Rakitzis
19. Emmanuel Xypakis
20. Konstantinos Rubedakis
21. Chara Troulinou
22. Anna-Maria Taki

Gravity Theories and their Avatars

[Home](#) | [Program](#) | [Information](#) | [Participants](#) | [Travel](#) | [CCTP](#)



**Crete
Center of
Theoretical
Physics
Heraklion
13-19 July
2012**

*(12 July is arrival
day, 20 July is
departure day)*



Keynote Speakers

- J. Erdmenger (Max Planck Institut, Munchen)
- M. Gaberdiel (ETH, Zurich)
- S. Gubser (Princeton)
- G. Horowitz (Santa Barbara)
- C. Hoyos (Tel Aviv University)
- R. Janik (Jagiellonian U.)
- S.J. Rey (Seoul National University, Seoul)
- T. Takayanagi (Yukawa Institute, Kyoto University)
- D. Tong (Cambridge)

International Organizing Committee	Local Organizing Committee
<ul style="list-style-type: none">• O. Aharony (Weizmann, Israel)• C. Bachas (ENS Paris, France)• M. Bianchi (Rome U., Italy)• J. Gauntlett (Imperial, UK)• M. Henneaux (Brussels)• D. Lust (Munich U. ASC, Germany)• K. Skenderis (Amsterdam, Netherlands)• J. Sonnenschein (Tel Aviv, Israel)	<ul style="list-style-type: none">• E. Kiritsis (U. of Crete)• V. Niarchos (U. of Crete) (chair)• T. Petkou (U. of Crete)• T. Tomaras (U. of Crete)• N. Tsamis (U. of Crete)

Photos from the [workshop](#) and [the banquet](#).



Project CreteHEPCosmo

REPORT

6th CRETE REGIONAL MEETING ON STRING THEORY

MILOS CONFERENCE CENTER, “GEORGE ILIOPOULOS”

JUNE 19 – 26, 2011

THEME TITLE: FP7-REGPOT-2008-1

Project acronym: Crete-HEP-Cosmo

Project full title: Crete Center for Particle Physics and Cosmology

Grant Agreement No: 228644

- **SCIENTIFIC PROGRAM/TALKS:** According to the format of the meeting we had several talks each day on subjects of current interest, followed by a session of questions and discussion. During lunch, dinner, coffee breaks and the time between the morning and afternoon talks one had the opportunity for extensive discussions with the speakers and interaction with the rest of the participants.
- **ELECTRONIC PROCEEDINGS:** The slides or transparencies of all talks have been posted in the [program webpage as below](#)

Meeting Program

Sunday 19 June

08:00 - Arrivals
20:00

Monday 20 June

08:30 - Welcome and Opening
09:00

Morning Session Chairman: E. Kiritsis

09:00 - [Y. Oz](#) [Holography and hydrodynamics](#)
(Tel-Aviv)

10:00 - [O. Aharony](#) [Holographic duals for N=4 SYM on spaces with a boundary](#)
(Weizmann)

11:00 - Coffee Break
11:30

11:30 - [G. Papadopoulos](#) [Special geometry of black hole horizons](#)
(King's College)

12:30 - [B. Kol](#) [Classical effective theory for weak ultra relativistic scattering](#)
(Hebrew)

13:30 - Lunch
15:30

Afternoon Session Chairman: I. Bakas

15:30 - [I. Papadimitriou](#) [Generalized holographic renormalization](#)
(CERN)

16:00 - [A. Parnachev](#) [Comments on AdS/CFT for higher derivative gravity](#)
(Leiden)

16:30 - [M. Guica](#) [Microscopic realization of the Kerr/CFT correspondence](#)
(Saclay)

17:00 - Coffee Break
17:30

17:30 - [D. Allahbakhshi](#) [On holography of Julia-Zee dyon](#)
(IPM)

18:00 - [T. Morita](#) [What is the gravity dual of the confinement/](#)
(Crete)

18:30		deconfinement transition in pure Yang-Mills theory?
18:30 -	R. Meyer	Holographic (de)confinement transitions in
19:00	(Crete)	cosmological backgrounds
19:00 -	N. Irges	Flavor corrections in the static potential in
19:30	(NTUA)	holographic QCD
19:30 -	A. Davody	Non-critical holographic QCD in external electric
20:00	(IPM)	field

Tuesday 21 June

Morning Session Chairman: F. Ardalan

09:00 -	I. Antoniadis	Mass hierarchies in string theory and holography
10:00	(CERN)	
10:00 -	G. Mandal	On the phase diagram of gauge theories with a large
11:00	(Tata)	number of adjoint scalars
11:00 -		Coffee Break
11:30		
11:30 -	K. Skenderis	The holographic fluid dual to vacuum Einstein gravity
12:30	(Amsterdam)	
12:30 -	J. Sonnenschein	On holographic nuclear interaction and nuclear matter
13:30	(Tel Aviv)	
13:30 -		Lunch
15:30		

Afternoon Session Chairman: G. Papadopoulos

15:30 -	E. Rabinovici	AdS crunches, CFT falls and cosmological
16:00	(Hebrew)	complementarity
16:00 -	K. Papadodimas	Comments on AdS/CFT and the cosmological
16:30	(CERN)	constant problem
16:30 -	N. Tetradis	New guises of the BTZ black hole and the entropy of
17:00	(Athens)	2d CFT
17:00 -		Coffee Break
17:30		
17:30 -	H. Afshar	Holography of conformal Chern-Simons gravity
18:00	(IPM)	
18:00 -	M. Lippert	Holographic models of the quantum Hall effect
18:30	(Crete)	
18:30 -	M. Jarvinen	Rotons in a holographic quantum Hall model
19:00	(Crete)	
19:00 -	G. Michalogiorgakis	Shock waves in strongly coupled plasmas
19:30	(Purdue)	
19:30 -	K. Dimopoulos	DBI vector fluxes as curvatons
20:00	(Lancaster)	

Wednesday 22 June

Morning Session Chairman: A. Schwimmer

09:00 -	C. Bachas	On the localization of gravity in string theory
10:00	(ENS)	
10:00 -	A. Strominger	From Navier-Stokes to Einstein
11:00	(Harvard)	

11:00 -		Coffee Break
11:30 -	D. Luest (LMU & MPI)	Non-commutative and non-associative closed string geometry from flux compactifications
12:30 -	S. Das (Kentucky)	Time dependent backgrounds and holographic quantum quench
13:30 -		Lunch
15:30 -		Excursion
20:00		

Thursday 23 June

Morning Session Chairman: S. Mukhi

09:00 -	A. Sen (HRI)	What can black holes tell us about microstates?
10:00 -	D. Kutasov (Chicago)	Conformal phase transitions at weak and strong coupling
11:00 -		Coffee Break
11:30 -	M. Alishahiha (IPM)	P-wave holographic insulator/superconductor
12:30 -	S. Wadia (Tata)	2+1 dim Chern-Simons gauge theory coupled to fermions and W_{∞} algebra
13:00 -	A. Schwimmer (Weizmann)	Spontaneous breaking of conformal symmetry and trace anomaly matching
13:30 -		Lunch
15:30		

Afternoon Session Chairman: D. Anninos

15:30 -	K. Zoubos (NBI)	Holographic three-point function of giant gravitons
16:00 -	G. Siopsis (Tennessee)	Holographic superconductors at low temperatures
16:30 -	L. Papantonopoulos (NTUA)	Holographic charge density waves
17:00 -		Coffee Break
17:30 -	B.S. Kim (Crete)	Transport properties of high T_c superconductor at very low temperature and AdS/CFT
18:00 -	M. Ali-Akbari (IPM)	Non-commutative holographic QCD and DC conductivity
18:30 -	M. Kroyter (Tel-Aviv)	Democratic superstring field theory and its gauge fixing
19:00		
21:00-		Banquet

Friday 24 June

Morning Session Chairman: S. Rouhani

09:00 - 10:00	<u>D. Jafferis</u> (IAS & Harvard)	<u>Sphere partition functions and the 3d superconformal R-charge</u>
10:00 - 11:00	<u>S. Mukhi</u> (Tata)	<u>Unraveling the novel Higgs mechanism in 2+1 dimensions</u>
11:00 - 11:30	Coffee Break	
11:30 - 12:30	<u>J. David</u> (Bangalore)	<u>Classical integrability in the BTZ black hole</u>
12:30 - 13:30	<u>E. Sezgin</u> (Texas A&M)	<u>Aspects of higher spin gravity</u>
13:30 - 15:30	Lunch	

Afternoon Session Chairman: I. Bakas

15:30 - 16:00	<u>F. Ardalan</u> (IPM)	<u>Exact renormalization group equation and gauge invariance for QED</u>
16:00 - 16:30	<u>F. Hassan</u> (Stockholm)	<u>Non-linear actions for massive gravity</u>
16:30 - 17:00	<u>R. Fareghbal</u> (IPM)	<u>D-dimensional log gravity</u>
17:00 - 17:30	Coffee Break	
17:30 - 18:00	<u>C. Kozcaz</u> (CERN)	<u>A-B-C approaches to surface operators</u>
18:00 - 18:30	<u>D. Anninos</u> (Harvard)	<u>Future infinity and the static patch De Sitter observer</u>
18:30 - 19:00	<u>S. Rouhani</u> (Sharif)	<u>Characterization of rough surfaces using Schramm-Loewner evolution</u>
19:00 - 19:30	<u>G. Gur Ari</u> (Weizmann)	<u>Brane inflation and moduli stabilization</u>
19:30 - 20:00	<u>A. Naseh</u> (IPM)	<u>On holographic stress tensor of critical gravity</u>

Saturday 25 June

Morning Session Chairman: E. Sezgin

09:00 - 10:00	<u>Z. Komargodski</u> (Weizmann & IAS)	<u>Exact results in softly broken supersymmetry</u>
10:00 - 11:00	<u>V. Niarchos</u> (Crete)	<u>An intriguing example of F-maximization in 3D SCFTs</u>
11:00 -	Coffee Break	

11:30

11:30 - [U. Gursoy](#) Spin models and holography
12:30 (CERN)

12:30 - [M. Garousi](#) S and T dualities of S-matrix
13:30 (Ferdowsi)

13:30 - Lunch
15:30

Afternoon Session Chairman: E. Kiritsis

15:30 - [H. Isono](#) Holographic Wilsonian renormalization groups: flow
16:00 (Tata) diagrams, fermions

16:00 - [D. Elander](#) Multi-scale dynamics on the baryonic branch of
16:30 (Tata) Klebanov -Strassler

16:30 - Coffee
17:00

END

Sunday 26 June

Departures

- IMPACT ON THE CENTER

The impact of the meeting «6th Crete regional meeting in string theory » on the CCTP was multifold. The event was coorganized with our Israeli partners, and with the eventual help of Iranian and Indian colleagues, as well as ICTP.

It was partly financed by the CreteHEPCosmo program. Most of the funding came from ICTP, Trieste, IAS Princeton, the Israeli Academy of Sciences, ICTS, India, as well as from individual Universities and Institutes of participants.

The main idea behind such a meeting is that there is a scientific exchange, not only between the two main partners of the region (CCTP and Israeli Excellence Center) but also other high quality regional Centers like IPM, Teheran and Tata Institute and Harish Chandra Institute in India. All partners have high quality research capabilities. Another goal was to invite and breed connections with your and good Greek researchers which are abroad with the idea of attracting in the future some of them to Greece.

A look at the participants list of scientists indicates that:

- 1) The most important scientists in the region were present.
- 2) The quality of such scientists is at the top level internationally.
- 3) The topics discussed and debated are at the cutting edge of the research in the field.
- 4) The few “outsiders” invited and attending, provided an extra variety in the subjects debated in the meeting.

Members of the Center came in close and extensive contact with top researchers and topics of intense current interest on the subject of the workshop. This will allow them to further their research, provide important visibility to the Center, its staff and other members, and in the long-run advance the status of the Center on the European research map.

On the scientific side, the topics presented in the workshop were mostly centered around the subject of gauge-gravity dualities: the fundamental principles underlying their structure and their applications to physical problems in high energy and condensed matter physics. More specifically, the topics that were covered include:

- (i) Applications of Holographic methods to the study of strongly coupled systems. Such methods, based on what is called the AdS/CFT correspondence have been applied to the study of formal properties of String Theory and N=4 Super Yang-Mills gauge theory, as well as the behavior of Quantum Chromodynamics, especially in relation to the Quark-Gluon plasma, a popular application which comes under the name AdS/QCD or Gauge/Gravity correspondence. During the last few years this approach has attracted a lot of attention and is being applied to Condensed Matter Theory (CMT) in an effort to shed light and understand interesting phenomena taking place in “down to earth” material systems. So, this topic is very broad and lies at the heart of scientific interests of

several members of the CCTP. All aspects and applications of the general approach were extensively presented and discussed by many speakers of the Workshop. Specifically, several talks were devoted to applications of these methods to Quantum Chromodynamics, hydrodynamics, transport properties in strongly couple systems, non-equilibrium properties, non-Fermi liquids, superconductivity and superfluidity, entanglement entropy and the Quantum Hall effect.

(ii)

(ii) The conceptual underpinnings and fundamental principles behind the AdS/CFT correspondence, also among the interests of a few members of the Center, were the subject of several talks in the workshop. Of particular interest was the study of low-dimensional examples of the AdS/CFT correspondence that involves two- and three-dimensional conformal field theories. In this context the relation to between two-dimensional conformal field theories and three-dimensional higher-spin field theories on AdS was discussed.

The members of the Center actively participated in discussions, both during the talks and in private, with the visiting scientists focusing primarily on the topics of their own research. The junior members of the Center had similar extensive contacts.

- **ADVERTISEMENT:** The Conference was announced and advertised by direct contact and emails to the relevant scientists of the region as well on the website of the Center: <http://hep.physics.uoc.gr/mideast6/>

- **WORKSHOP EXPENSES**

Expenses	Amount
Travel and Accomodation expenses	12,657.59
TOTAL	12,657.59

The following CCTP scientists and secretary were supported with Travel and Accommodation expenses:

Kiritsis Elias
Meyer Rene
Makaki Eva
Lippert Matthew
Zhang Hongbao
Pavlopoulos George

Dimopoulos Constantinos
Iatrakis John
Taliotis Anastasios
Morita Takeshi
Kim Bom Soo
Niarchos Vasilios
Jarvinen Matti
Bakas Ioannis

- **CONCLUSIONS:** The scientific conclusions of the Conference may be briefly summarized as follows:

(a) The AdS/CFT conjecture and the new methods it inspires have been extended, appropriately modified and used recently to the study of open problems in a wide variety of fields including off-equilibrium hydrodynamics, transport properties in strongly coupled systems, non-Fermi liquids, superconductivity and superfluidity, entanglement entropy, the Quantum Hall effect, and the quark-gluon plasma phase of Quantum Chromodynamics (QCD).

(b) Progress has been made in the understanding of the subleading terms in the black hole entropy and its connection with the characteristics of the low energy physics of the associated systems. Some such subleading corrections can be directly computed via EFT, and they provide a consistency test of the associated EFT.

(c) The underlying principles behind the AdS/CFT correspondence and their implications for fundamental theory are not yet fully explained but significant recent progress has been achieved. A new set of dualities between two-dimensional conformal field theories and three-dimensional higher-spin theories on AdS have been proposed and non-trivially tested leading to a new paradigm of gauge-gravity duality. New examples of the AdS/CFT correspondence for two-, three-, and four-dimensional CFTs are now starting to yield a more global understanding of the basic properties of the holographic duality. (c) It was also interesting to hear about other progress in string theory and General Relativity. The development of a more general framework of duality symmetry groups in string theory was reported as well as a new type of gravitational instabilities in Anti-de Sitter space-times.

- **ORGANIZATION/PARTICIPANTS:** The scientific committee and the local organizing committee may be found on the conference website <http://hep.physics.uoc.gr/mideast6/>. The total number of participants was 74. Of those 14 were local researchers, members of our Crete Center for Theoretical Physics (CCTP).

Participants

Name	Affiliation
1. Afshar Hamid Reza	IPM
2. Aharony Ofer	Weizmann Institute of Science
3. Ali-Akbari Mohammad	IPM
4. Alishahiha Mohsen	IPM
5. Allahbakhshi Davood	IPM
6. Anninos Dionysios	Harvard
7. Antoniadis Ignatios	CERN
8. Ardalan Farhad	Senior Fellow of IPM
9. Bachas Constantin	Ecole Normale, Paris
10. Bakas Ioannis	University of Patras
11. Closset Cyril	Weizmann Institute
12. Dimopoulos Konstantinos	LANCASTER UNIVERSITY
13. Das Sumit	University of Kentucky
14. David Justin	Indian Institute of Science, Bangalore
15. Davody Ali	Institute for Studies in Theoretical Physics and Mathematics (IPM)
16. Elander Daniel	Tata Institute of Fundamental Research
17. Fareghbal Reza	IPM
18. Garousi Mohammad Reza	Ferdowsi University of Mashhad
19. Giataganas Dimitrios	Witwatersrand University
20. Guica Monica	IPhT, CEA Saclay
21. Gur Ari Guy	Weizmann Institute of Science
22. Gursoy Umut	CERN
23. Hassan Fawad	Stockholm University
24. Iatrakis Yiannis	University of Crete
25. Irges Nikos	NTUA
26. Isono Hiroshi	Tata Institute of Fundamental Research
27. Jafferis Daniel	Harvard University/IAS
28. Jarvinen Matti	UoC
29. Kim Bom Soo	University of Crete
30. Kiritsis Elias	UoC
31. Kol Barak	Hebrew Un
32. Komargodski Zohar	Weizmann Institute for Science and IAS
33. Kozcaz Can	CERN
34. Kroyter Michael	Tel-Aviv University
35. Kulaxizi Manuela	University of Uppsala
36. Kutasov David	EFI, UNiversity of Chicago

Name	Affiliation
37. Leontaris George	Ioannina University
38. Lindstrom Ulf	Uppsala University
39. Lippert Matthew	University of Crete
40. Luest Dieter	LMU-Munich, MPI-Munich
41. Makaki Eva	UoC
42. Mandal Gautam	Tata Institute of Fundamental Research, India
43. Meyer Rene	University of Crete
44. Michalogiorgakis Georgios	Purdue U.
45. Morita Takeshi	UOC
46. Mosaffa Amir Esmail	Sharif University
47. Mukhi Sunil	Tata Institute of Fundamental Research, Mumbai
48. Naseh Ali	IPM
49. Niarchos Vasilis	University of Crete
50. Oz Yaron	Tel-Aviv University
51. Papadimitriou Ioannis	CERN
52. Papadodimas Kyriakos	CERN
53. Papadopoulos Georgios	King's College London
54. Papantonopoulos Eleftherios	NTUA
55. Parnachev Andrei	Leiden University
56. Pastras Georgios	EPFL
57. Pavlopoulos Georgios	UoC
58. Rabinovici Eliezer	Hebrew University
59. Rouhani Shahin	Physics Department, Sharif Unniversity of Technology, Tehran, Iran.
60. Schwimmer Adam	Weizmann Institute
61. Sen Ashoke	HRI
62. Sezgin Ergin	Texas A&M University
63. Shacham Tomer	Hebrew University of Jerusalem
64. Siopsis George	University of Tennessee
65. Skenderis Kostas	University of Amsterdam
66. Skliros Dimitri	Nottingham University
67. Sonnenschein Jacob	Tel Aviv
68. Sourdis Christos	Tech.E.I. of Chalkis
69. Taliotis Anastasios	University of Crete
70. Tetradis Nikolaos	University of Athens
71. Wadia Spenta	TIFR, MUMBAI (INDIA)
72. Zhang Hongbao	University of Crete
73. Zoubos Konstantinos	NBI, Copenhagen
74. elitzur shmuel	Hebrew University

SIXTH CRETE REGIONAL MEETING IN STRING THEORY

[Home](#) | [Program](#) | [Information](#) | [Participants](#) | [Travel](#) | [The region](#)

[Milos](#)
[Conference](#)
[Center](#)
George
Eliopoulos,
June 19 -
June 26 2011

*(19 June is arrival day,
26 June is departure
day)*



International Organizing Committee

- F. Ardalan (IPM, Teheran)
- I. Bakas (U. of Patras)
- E. Kiritsis (U. of Crete)
- K. Narain (ICTP, Trieste)
- E. Rabinovici (Hebrew U., Jerusalem)
- S. Wadia (ICTS and Tata I., Mumbai)
- E. Witten (IAS, Princeton)

Here are photos from the meeting: [the group photo \(4 Mb\)](#) and a [cropped version \(1.2 Mb\)](#), [the banquet photos](#) and other [social photos](#).



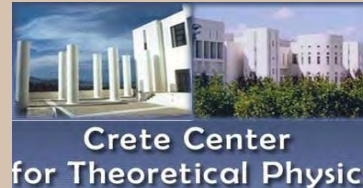
Abdus Salam ICTP



Institute of Advanced Study



S&B Industrial Minerals



CCTP, Crete, Greece



CreteHEPCosmo



ICTS, India

Website of the first, second, third, , fourth and fifth meeting

REPORT

SIXTH AEGEAN SUMMER SCHOOL
QUANTUM GRAVITY AND
QUANTUM COSMOLOGY

NAXOS ISLAND, GREECE
SEPTEMBER 12 – 17, 2011

THEME TITLE: FP7-REGPOT-2008-1

Project acronym: Crete-HEP-Cosmo

Project full title: Crete Center for Particle Physics and Cosmology

Grant Agreement No: 228644

- **SCIENTIFIC PROGRAM/TALKS:** According to the format of the School, there were pedagogical lectures in the morning and specialized talks in the afternoon. There was also a session of questions and discussion.

PROGRAM

MONDAY 12 SEPTEMBER

	CODE	SPEAKER	TITLE OF LECTURE
8:45-9:00	WELCOME		
9:00-10:00	QG.1	A. Ashtekar	Introduction to Quantum Gravity
10:00-11:00	QG.2	K. Stelle	Quantum Gravity and String Theory
11:00-11:30	COFFEE		
11:30-12:30	C1	J. Silk	Observational Status of Dark Matter
12:30-13:30	C2	R. Bradenberger	Unconventional Cosmology in the Early Universe
13:30-14:30	LUNCH		
16:00-16:30	S1	A. Goerlich	Introduction to Dynamical Triangulation
16:30-17:00	S2	M. Arzano	Quantum Fields on Curved Momentum Space
17:00-17:30	S3	O. Evnin	Quantum Backreaction in String Theory
17:30-18:00	S4	S. Alexander	Inflation, Parity Violation and Baryogenesis
18:00-18:15	COFFEE		
18:15-18:30	S5	S. Rechenberger	Lorentzian Quantum Einstein Gravity
18:30-18:45	S6	L. Sindoni	Emergent Gravity from Group Field Theories
18:45-19:00	S7	J. Ohashi	Observational Constraints on Assisted k-inflation
19:00-19:15	S8	C. Guedes	The Space of Generalized Fluxes for U(1) Loop Quantum Gravity
19:15-19:30	S9	A. Patrushev	Hamilton-Jacobi Equation for Gravity
19:30-19:45	S10	P. Hoehn	Canonical Simplicial Gravity
19:45-20:00	S11	J. Ovalle	Astrophysical Solutions in Randall-Sundrum Gravity

TUESDAY 13 SEPTEMBER

	CODE	SPEAKER	TITLE OF LECTURE
9:00-10:00	QG.1	A. Ashtekar	Introduction to Quantum Gravity
10:00-11:00	QG.2	K. Stelle	Quantum Gravity and String Theory
11:00-11:30	COFFEE		
11:30-12:30	QG.3	M. Reuter	Asymptotically Safe Quantum Gravity

12:30-13:30	C2	R. Brandenberger	Unconventional Cosmology in the Early Universe
13:30-14:30	LUNCH		
16:00-16:30	S12	B. Wang	Interaction between Dark Energy and Dark Matter
16:30-17:00	S13	E. Abdalla	Dark Sector Interactions in Cosmology
17:00-17:30	S14	L. Modesto	Super-renormalizable Quantum Gravity
17:30-18:00	S15	M. Katanaev	Geometric Theory of Defects and Gravity
18:00-18:15	COFFEE		
18:15-18:30	S16	M. Geiller	Spin Foam Models: Lessons from the Canonical Theory
18:30-18:45	S17	D. Becker	Non-perturbative Renormalization of the Gibbons-Hawking Term
18:45-19:00	S18	U. Harst	Tetrad Quantum Gravity and Asymptotic Safety
19:00-19:15	S19	L. Bethke	Chiral Vacuum Fluctuations and the Ground State of Quantum Gravity
19:15-19:30	S20	S. Gielen	A Cosmological Model for 3rd Quantisation
19:30-19:45	S21	B. Cuadros-Melgar	Lorentz Violating Massive Gravity
19:45-20:00	S22	P. Wallden	Canonical Quantum Cosmology, the Problem of Time and the Decoherent Histories

WEDNESDAY 14 SEPTEMBER

	CODE	SPEAKER	TITLE OF LECTURE
9:00-10:00	QG.3	M. Reuter	Asymptotically Safe Quantum Gravity
10:00-11:00	QG.4	C. Bachas	Localization of Gravity in String Theory
11:00-11:30	COFFEE		
11:30-12:30	QG.5	E. Bergshoeff	Massive Gravity
12:30-13:30	QG.6	C. Wetterich	Spinor Gravity - a Probabilistic Proposal for Quantum Gravity

EXCURSION TO NAXOS ISLAND

THURSDAY 15 SEPTEMBER

	CODE	SPEAKER	TITLE OF LECTURE
9:00-10:00	QG.7	C. Rovelli	Loop Quantum Gravity
10:00-11:00	QC.1	A. Ashtekar	Quantum Gravity and Cosmology
11:00-11:30	COFFEE		
11:30-12:30	QG.5	E. Bergshoeff	Massive Gravity
12:30-13:30	QC.2	M. Bojowald	Loop Quantum Cosmology
13:30-14:30	LUNCH		
16:00-16:30	S23	N. Tetradis	New Quises of the BTZ Black Hole and 2d CFT
16:30-17:00	S24	O. Bertolami	Phase-space Noncommutative Quantum Cosmology and Black Holes
17:00-17:30	S25	R. Troncoso	Anisotropic Holography and the Microscopic Entropy of Lifshitz Black Holes in Three Dimensions
17:30-18:00	S26	G. Mena Marugan	Matter in Inhomogeneous Loop Quantum Cosmology: the Gowdy Model
18:00-18:15	COFFEE		
18:15-18:30	S27	R. Kase	Matter Perturbations in Galileon Cosmology
18:30-18:45	S28	F. Vidotto	An Invitation to Spinfoam Cosmology
18:45-19:00	S29	S. Carrozza	Singular topologies in GFT
19:00-19:15	S30	M. Martin-Benito	Effective Dynamics from Spinfoam Cosmology
19:15-19:30	S31	S. Bhattacharje	Gauge Invariant Coupling of Fields to Torsion: a String Inspired Model
21:00	BANQUET		

FRIDAY 16 SEPTEMBER

	CODE	SPEAKER	TITLE OF LECTURE
9:00-10:00	QG.7	C. Rovelli	Loop Quantum Gravity
10:00-11:00	QC.2	M. Bojowald	Loop Quantum Cosmology
11:00-11:30	COFFEE		
11:30-12:30	C3	S. Tsujikawa	Observational Status and Models of Dark Energy
12:30-13:30	QC.3	R. Woodard	Quantum Gravity and Inflation
13:30-14:30	LUNCH		

16:00-16:30	S32	V. Bonzom	Recent lessons from the Topological BF Model for LQG
16:30-17:00	S33	T. Tomaras	Gravitational Bremsstrahlung in Transplanckian Collisions
17:00-17:15	S34	C. Chryssomalakos	Operational Geometry and Natural Noncommutativity
17:15-17:30	S35	S. Miao	Modified Gravity from the Standard Model
17:30-17:45	S36	T. Christodoulakis	Cannical Quntization of Geometries Admitting 2d-surfaces of Maximal Symmetry
17:45-18:00	S37	P. Pasipoularidis	Spherically Symmetric Solutions in Covariant Horava-Lifshitz Gravity
18:00-18:15	S38	M. Scalisi	Fractal and Noncommutative Spacetimes: a Connection
18:15-18:30	COFFEE		
18:30-18:45	S39	I. Güllü	Massive Gravity Theories in (Anti-) de Sitter Spacetimes
18:45-19:00	S40	R. Toriumi	Quantum Gravity and Cosmological Density Perturbations
19:00-19:15	S41	T. Sisman	Critical Gravity in D Dimensions
19:15-19:30	S42	J. Mielczarek	Quantum Dynamics of the Reduced Phase Space Loop Cosmology
19:30-19:45	S43	I. Premont-Schwarz	Primordial Loop Black Holes as Dark Matter
19:45-20:00	S44	J. Olmedo	Prescriptions and Superselection Sectors in Loops Quantum Cosmology

SATURDAY 17 SEPTEMBER

	CODE	SPEAKER	TITLE OF LECTURE
9:00-10:00	C3	S. Tsujikawa	Observational Status and Models of Dark Energy
10:00-11:00	QC.4	P. McFadden	Holographic Universe
11:00-11:30	COFFEE		
11:30-12:30	QC.3	R. Woodard	Quantum Gravity and Inflation
12:30-13:00	Discussion Session		
13:00-13:15	Concluding Remarks		

THE TOPICS AND PHYSICS

Quantum gravity is a fast growing field in physics and its study is expected to give answers of the short-distance behaviour of theories of gravitation. Probing the high-energy and high-curvature regimes of gravitating systems will shed some light on the ways to achieve an ultraviolet complete quantum theory of Gravity, giving us information about fundamental problems of classical Gravity such as the initial big bang singularity, the cosmological constant problem and the physics at the Planck scale. On the other hand, it will give vital information on the early-time inflationary evolution of our Universe. The aim of the 6th Aegean Summer School is to discuss quantum gravity theories in connection with cosmological models and observations, and explore what type of signature modern and mathematically rigorous frameworks can be detected by experiments. It is also aimed at introducing postgraduate students and young researchers to this very challenging topic that recently has attracted much interest. Various aspects of Quantum Gravity and Quantum Cosmology will be discussed: Quantum Gravity and String Theory, Discretized Gravity, Loop Quantum Gravity, Quantum Criticality in Condensed Matter Physics, Loop Quantum Cosmology, Quantum Gravity Phenomenology, Quantum Gravity and Inflation, Quantum Gravity Constraints on Models of Dark Matter and Dark Energy, Holographic Universe, Asymptotically Safe Quantum Gravity. The invited speakers include: A. Ashtekar, E.A. Bergshoeff, M. Bojowald, R. Brandenberger, M. Reuter, C. Rovelli, J. Silk, K. S. Stelle, S. Tsujikawa, C. Wetterich, R. P. Woodard.

The Crete Center for Theoretical Physics provided financial support for:

Invited Lecturers

Robert Brandenberger (*McGill University, Montreal, Canada*)

Kellogg Stelle (*Imperial College, London, UK*)

Richard Woodard (*University of Florida, Gainesville, USA*)

The Summer School Secretary

Fani Siatra (*NTUA, Athens, Hellas*)

Members of the Center

Theodore Tomaras, Nikolaos Tsamis (*faculty*)

Maria Romania (*PhD student*)

Impact

Students Education

There were about 80 students from all over the world that participated in the School and heard from leading experts the latest developments in the field.

Book

The proceedings of the School will be published by Springer-Verlag GmbH Berlin Heidelberg: “*Quantum Gravity and Quantum Cosmology*”.

ADVERTISEMENT:

The Summer School was announced in a four-fold way:

- (i) the website of the School, <http://www.physics.ntua.gr/cosmo11/>
- (ii) university, research center, and conference announcement sites
- (iii) emails to scientists relevant to the subject
- (iv) press release to the local press

- **WORKSHOP EXPENSES COVERED BY CRETEHEPCOSMO**

Expenses	Amount
Travel and Accomodation expenses	3,452.68
Secretary	2,500.00
TOTAL	5,952,68

- **CONCLUSIONS:**

- (a) The scientific field has many approaches and there is not yet a consensus on the which is the best in dealing with Quantum gravity and associated quantum cosmology.
- (b) Quantum effects in cosmology have come of age, and there are serious efforts to understand their implications on the cosmological data.

- **ORGANIZATION/PARTICIPANTS:** The scientific committee and the local organizing committee may be found on the conference website <http://www.physics.ntua.gr/~zamarias/cosmo11/Naxos2011/> and are also given here.

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Secretary

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- The total number of participants was 121. The majority were young researchers attending the school.

Surname	Name	Home Institute	Country
Abdalla	Elcio	Instituto de Fisica, Universidade de Sao Paulo	Brazil
Alexander	Stephon	Haverford College & Princeton University	U.S.A.
Arzano	Michele	Utrecht University	The Netherlands
Ashtekar	Abhay	Institute for Gravitation and the Cosmos, Physics Department, Penn State, University Park	U.S.A.
Astorino	Marco	Centro de Estudios Cientificos (CECs), Valdivia	Chile
Atkins	Michael	University of Sussex	U.K.
Axenides	Minos	Nuclear Centre Dimokritos	Greece
Bachas	Costas	Ecole Normale Supérieure	France
Becker	Daniel	Johannes Gutenberg, University Mainz	Germany
Bergshoeff	Eric A.	Centre for Theoretical Physics, University of Groningen	The Netherlands
Bertolami	Orfeu	Departamento de Fisica e Astronomia, Faculdade de Ciencias, Universidade do Porto	Portugal
Bethke	Laura	Imperial College London	U.K.
Bhattacharjee	Srijit	Saha Institute Of Nuclear Physics	India
Bojowald	Martin	Institute for Gravitation and the Cosmos, The Pennsylvania State University	U.S.A.
Bonzom	Valentin	Perimeter Institute	Canada
Brandenberger	Robert	Physics Department, McGill University	Canada
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Carrozza	Sylvain	A. Einstein Inst. / LPT Orsay	Germany / France
Chen	Tai-jun	DAMTP, University of Cambridge	U.K.
Chiou-Lahanas	Catherine	National and Kapodistrian University of Athens	Greece
Christodoulakis	Theodosios	National and Kapodistrian University of Athens	Greece
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Cortés Barbado	Luis	Institute of Astrophysics of Andalusia (CSIC)	Spain
Crampton	Benedict	Imperial College London	U.K.
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Depetri	Gabriela	Unicamp	Brazil
Dimitropoulos	Andreas	Vocational Secondary School of Megara	Greece
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Lima	William	Universidade de Sao Paulo	Brazil

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Modesto	Leonardo	Perimeter Institute	Canada
Moniz	Paulo	Universidade da Beira Interior	Portugal
Nascimento	Danilo	Universidade de Sao Paulo	Brazil
Nikolakopoulos	Konstantinos	University of Sussex	U.K.
Nink	Andreas	Institute of Physics, University of Mainz	Germany
O'Donnell	Kane	University of Canterbury	New Zealand
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Patrushev	Alexander	University of Western Ontario	Canada
Pouri	Athina	KEAEM	Greece
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Roupas	Zacharias	NTUAthens & NCSR Demokritos	Greece
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Sampson	Almeira	Instituto de Fisica Teorica (UNESP)	Brazil
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Sindoni	Lorenzo	Max Planck Institute for Gravitational Physics (A. Einstein Inst.)	Germany
Siopsis	George	The University of Tennessee	U.S.A.
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