University of Crete HEP Seminars

Tue Feb 15, 2011

2pm

Ioannis Papadimitriou (CERN) on "Holographic renormalization for generic Hamiltonian systems and application to Improved Holographic QCD"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: Holographic renormalization has emerged as a systematic method for addressing certain pathologies, such as large distance divergences of the on-shell action and the ill-posedness of the variational problem, of supergravity in asymptotically anti de Sitter space in the context of the AdS/CFT correspondence. I will show that the same pathologies arise in a much wider class of Hamiltonian systems, not necessarily related with a holographic duality, and that the same techniques can be applied to these more general systems too. This opens the way for systematically understanding the holographic dictionary for many interesting holographic dualities involving non asymptotically AdS spaces. I will demonstrate this by carrying out the holographic renormalization program for the Improved Holographic QCD model of Gursoy and Kiritsis, which includes an asymptotically logarithmically running dilaton.

Mon Feb 21, 2011

4pm Christos Charmousis (LPT) on "Lovelock Black Holes with Matter Sources"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
Abstract: I will discuss the higher dimensional version of GR namely Lovelock theory. After depicting some basic properties of this theory we will see that a generalisation of a GR staticity theorem enables us to find and classify black hole solutions in Lovelock theory. We will see how certain solutions of higher dimensional GR such as black strings are disallowed and how Lovelock theory approaches stringent black hole theorems of 4 dimensional general relativity. We will discuss novel solutions with scalar, magnetic 2 form and three form charges.

Tue Feb 22, 2011

2pm

Markus Mueller (ICTP) on "Graphene : Relativistic transport in a nearly perfect quantum liquid, and its relation with AdS-CFT"

Where: 1st Floor Seminar Room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: Electrons and holes in clean graphene behave like a strongly coupled relativistic liquid. The thermo-electric transport properties of its interacting Dirac quasiparticles are rather special, being constrained by an emergent Lorentz covariance at hydrodynamic frequency scales. At small carrier density and high temperatures, graphene exhibits several signatures of a quantum critical system: an inelastic scattering rate set only by temperature, minimal electrical and spin conductivities dominated by electron-hole friction, and a very low viscosity. In this regime one finds pronounced deviations from standard Fermi liquid behavior. These results, obtained by Boltzmann transport theory at weak coupling, are fully consistent with the predictions of relativistic hydrodynamics. Closely analogous behavior is found in certain strongly coupled relativistic liquids, which can be analyzed exactly via the AdS-CFT correspondence. The latter has indeed helped us identifying and establishing the peculiar properties of graphene.

University of Crete HEP Seminars

Fri Feb 25, 2011

3pm

Dario Martelli (King's Coll) on "Towards a Matrix Model/Sasaki-Einstein Correspondence"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: I will discuss recent progress in the context of the AdS_4/CFT_3 correspondence. In particular, I will describe new tests of the correspondence in examples of N=2 Chern-Simons-matter theories with Sasaki-Einstein gravity duals.

Tue Mar 1, 2011

2pm

Demetri Christodoulou (ETH) on "Acoustical Geometry and Shock Formation"

Where: 1st floor seminar room
Calendar: University of Crete HEP Seminars

Fri Mar 4, 2011

3pm Pavel Spirin (Crete) on "Radiation Reaction in GR"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: We consider different aspects of the renormalisation, emission and radiation reaction in space-time of different dimensionality. Starting from the first examples by Schott and Dirac, we overview the 1-particle equations by deWitt-Brehme and Schwinger-DeWitt approaches and transfer to the partial realizations like Smith-Will force and transplanckian ultra-relativistic bremsstrahlung of point-like particles. Namely, we present calculation of scalar and gravitational bremsstrahlung under scattering of ultrarelativistic point particles in the model with d large toroidal extra dimensions. For this we generalize the standard linearized ADD scheme to second order in gravitational coupling including the three-graviton vertex. Classical calculation is performed in the momentum space, it involves Kaluza-Klein modes both in interaction and radiation, and is free of divergences apart from the mass renormalization. We obtain the total energy loss in the leading order of powers of the inverse Lorentz boost factor.

Tue Mar 8, 2011

2pm Ioannis Bakas (Patras) on "Instantons of Lifshitz Theories"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description: ABSTRACT:

University of Crete HEP Seminars

Fri Mar 11, 2011

11am

Matti Jarvinen (Crete) on "Informal discussion on the results of the first heavy ion run at the LHC"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
The papers for the informal discussion on the results of the first heavy ion run at the LHC (roughly in the order of importance) are: On charged particle multiplicity http://arxiv.org/abs/arXiv:1011.3916 and http://arxiv.org/abs/1012.1657 On elliptic flow http://arxiv.org/abs/arXiv:1011.3914 Dijet asymmetry http://arxiv.org/abs/arXiv:1011.6182 Suppression of charged particles at high pt http://arxiv.org/abs/1012.1004 There are quite a few papers, but they are all (in particular the discussion of the physics is) very brief. The results are discussed in the slides of the workshop at cern http://indico.cern.ch/conferenceOtherViews.py?view=standard&confId=118273 In particular Nicolas Borghinis talk which summarises the most important findings and physics interpretation can be useful. If you are not too familiar with heavy ions, you can have a look, for example, at the chapter two in the review http://arxiv.org/abs/arXiv:1101.0618

Tue Mar 22, 2011

2pm Jan Troost (Ecole Normale) on "A Non-Compact Elliptic Genus"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description: ABSTRACT:

Thu Mar 24, 2011

5pm

Jan Zaanen (Leiden) on "String theory and the mysterious quantum matter of condensed matter physics "

Where: 3rd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
Abstract : The general nature of matter formed from fermions ismysterious. The established methods of many body quantum physics failand empirically one finds that the phenomenological Fermi-liquid andBCS theories fail: non Fermi-liquid quantum critical metals areobserved in heavy fermion systems and cuprate high Tc superconductors.Remarkably, it appears that the mathematics of string theory is capableof describing such states of fermion matter. The AdS/CFT correspondencetranslates this problem into an equivalent general-relativity probleminvolving the propagation of classical fields in an Anti-de-Sitterspace-time with a black hole in its center. Triggered by the succes ofAdS/CFT predicting the low viscosity of the quark-gluon plasma, thefocus shifted very recently to the fermions, creating much excitement.It appears that both emergent Fermi-liquids and non Fermi-liquids canbe gravitationally encoded, as well as ‘holographic’ superconductorshaving suggestive traits in common with the real life high Tc variety.

University of Crete HEP Seminars

Fri Mar 25, 2011

3pm

Jan Zaanen (Leiden) on "Mott collapse, statistical quantum criticality and high Tc superconductivity."

Where: 1st floor seminar room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: Shortly after the discovery of high Tc superconductivitynearly a quarter of a century ago Phil Anderson pointed out that thisphenomenon might be rooted in the proximity to the Mott insulator. His‘resonating valence bond’ idea was instrumental as a metaphor for this‘different’ physics but due to the lack of real mathematical controlthis ‘Mottness’ problem turned into one of the main problems of modernfundamental physics. In some modified form similar principles might beat work in the new iron superconductors. Much more recently ZhengYuWeng of Tsinghua discovered that this Mottness actually alters the fundamental rules of quantum statistics: in doped Mott insulatorsneither Fermi-Dirac nor Bose-Einstein statistics is ruling, but insteada novel form of “Weng Statistics” where the exclusion principle and soforth are governed by the precise organization of the quantum matter.Based on high temperature expansions and a variety of other controlledresults on the t-J model I will argue that Weng statistics isunderlying the physics of the underdoped pseudogap regime, with itsintrinsic tedencies towards superconductivity that are however hamperedby equally intrinsic tendencies towards a variety of competing orders.I then will show that Weng statistics excludes the Fermi-liquidbehavior found in overdoped cuprates, with the implication that theMottness has to come to an end in optimally doped cuprates. Optimallydoped cuprates are in the grip of a clash between Weng- and Fermi-Diracstatistics taking the form of a highly non-classical form of quantumcriticality. Although we know very little about such states, I willpresent new results from numerical DCA calculations by Jarrel’s groupshowing that at such a quantum critical point one finds a ‘relevantquantum critical’ pair susceptibility that greatly enhances the BCStype superconducting instability.

Tue Mar 29, 2011

2pm

Harvey Meyer (Mainz) on "Extracting Real-Time Quantities from Euclidean Field Theory"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: In the context of Quantum Chromodynamics, non-perturbative observables such as the low-lying spectrum of hadrons can be extracted from the theory discretized on a Euclidean space-time lattice and simulated on a computer. Real-time quantities on the other hand, such as phase shifts, time-like form factors, or transport properties at finite temperature, cannot be straightforwardly computed. In some cases however real-time effects leave signatures in the Euclidean theory which can be isolated in certain kinematical regimes. I describe several examples of this type at zero and finite-temperature.

University of Crete HEP Seminars

Wed Mar 30, 2011

1pm

Subodh Patil (Polytechnique) on "Features of Heavy Physics in the CMB Power Spectrum"

Where: 1st floor seminar room
Calendar: University of Crete HEP Seminars
Description:
Abstract: It is widely appreciated that the observed properties of the CMB are accurately reproduced by a scale invariant spectrum of primordial metric fluctuations, strongly suggesting an earlier epoch of slow roll inflation. However, direct and accurate reconstructions of the primordial spectrum from the raw CMB data is limited by degeneracies in the priors and the systematics adopted in our analyses. It may very well be that the data can be better fit by a primordial spectrum which deviates from scale invariance in possessing certain features. In this talk we discuss how such features (in the form of damped, superimposed oscillations) can arise from the non-decoupling of certain heavy operators in multi-field inflation due to sharp turns in the inflaton trajectory-- a generic feature of string inflation. Information on the theory in which inflation is embedded can be inferred from the properties of these features. In the two-field case, we are able to compute an effective theory for the adiabatic mode encapsulating the relevant operators of the full multi-field dynamics. This effective theory exhibits a modified speed of sound that is a functional of the curvature of the background inflaton trajectory, anticipating non-Gaussian signatures directly correlated to the features imprinted in the power spectrum.

Thu Mar 31, 2011

5pm

Alessandro Strumia (Pisa) on "Dark Matter Interpretations of the Electron/Positron Excesses "

Where: 3rd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
We review how the cosmic-ray excess observed by PAMELA in the positron fraction and by FERMI and HESS in the electron and positron flux can be interpreted in terms of Dark Matter with unexpected properties and how we hope to clarify the issue.

Fri Apr 1, 2011

3pm Alessandro Strumia (Pisa) on "Implications of First LHC Results"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: We discuss implications of the first LHC results about supersymmetry and large extra dimensions. In particular we derive the new dominant bound on tree-level graviton exchange from pp -> jj data

University of Crete HEP Seminars

Tue Apr 5, 2011

2pm

Umut Gursoy (CERN) on "Continuous Hawking-Page Transitions and Gravity/Spin-Model Correspondence"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: I will discuss the Hawking-Page transiitons of second or higher order in gravity coupled to a single scalar field. These transitions serve as a holographic dual for certain continuous phase transitions found in finite T spin-systems. The connection can be made through use of lattice gauge theory which, independently, provides an alternative first principles way of connecting condensed matter systems with gravitational theories.

Fri Apr 8, 2011

3pm Lefteris Papantonopoulos (NTUA) on "Holographic Charge Density Waves"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: We discuss a gravity dual of a charge density wave. In the background (probe limit) of a Schwarzschild-AdS$_4$ black hole together with an antisymmetric field we consider an U(1) gauge field and two scalar fields. Interactions drive the system to a phase transition below a critical temperature. We numerically compute the ground states characterized by modulated solutions for the gauge potential corresponding to a dynamically generated unidirectional charge density wave in the conformal field theory. Signatures of the holographic density waves are retrieved by studying the dynamical response to an external electric field. We find that this novel holographic state shares many common features with the standard condensed matter version of charge density wave systems.

Tue Apr 12, 2011

2pm Daniel Arean (SISSA) on "Holographic Superflows"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: I will describe the construction of holographic duals to superfluid flows. This will first allow us to study the phase diagram of these systems. Then we will focus on the zero temperature limit and learn about the ground state of the model.

Fri Apr 15, 2011

3pm Claudia de Rham on "Boulware-Deser Ghost in Massive Gravity"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: I will review the different arguments that have lead to the common belief that "No acceptable tensor gravitational theory with arbitrary long but finite range exists" as any such theory would excite a ghost scalar mode. After discussing the limitations of such arguments, I will present explicit healthy toy-models for which the previous arguments would have wrongly inferred the existence of a ghost. Finally I will construct an explicit covariant theory of massive gravity which bypasses all the previous arguments and strongly suggests the existence of an entirely ghost-free classical theory of massive gravity.

University of Crete HEP Seminars

Tue May 3, 2011

2pm Alex Kehagias (NTUA) on "The Classicalization Proposal"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: I will present a novel approach to UV-completion of a class of non-renormalizable theories. According to this, high-energy scattering amplitudes get unitarized by the production of extended classical objects, playing a role analogous to black holes, in the case of non-gravitational theories. Classicalization may have interesting phenomenological applications for the UV-completion of the Standard Model both with or without the Higgs.

Wed May 4, 2011

11am Alexander Vikman (CERN) on "Kinetic Gravity Braiding"

Where: 1st floor seminar room
Calendar: University of Crete HEP Seminars
Description:
Abstract:: I will discuss a new class of non-canonical scalar fields. Similarly to gravity, these theories are described by actions linearly depending on second derivatives. The latter can not be excluded without breaking the generally covariant formulation of the action principle. Despite the presence of these second derivatives the equations of motion are still of the second order. Hence there are no new pathological degrees of freedom. Because of this structure of the theory the scalar field kinetically mixes with the metric- the phenomenon we have called Kinetic Gravity Braiding. These theories have rather unusual cosmological dynamics which may be useful to model Dark Energy and Inflation. I will discuss an equivalent hydrodynamical formulation of these theories, stability and causality for the fluid like configurations and cosmological applications.

Fri May 6, 2011

3pm

Hongbao Zhang (Crete) on "Quasi-Normal Modes from Unexpected Isometry Group Structure in BTZ Black Holes"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
Abstract:: After a brief review of implications of quasi-normal modes in physics, I will focus on the case for BTZ black holes, where the isometry group structure is reasoned to have some interesting features, which leads us to construct quasi-normal mode in a purely algebraic way.

University of Crete HEP Seminars

Tue May 10, 2011

2pm

Nick Evans (Southampton) on "Phase Structure of Strongly Coupled Gauge Theories"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: Holographic techniques allow us to study a set of strongly coupled gauge theories. I focus on one such theory (based on the D3/D7 system) with gluons and quarks. The model has some aspects of confinement. Chiral symmetry breaking is induced by a running coupling or magnetic field. Temperature, chemical potential and an electric field can also be introduced. The phase structure is interesting with meson dissociation transitions and chiral symmetry restoration transitions - these can coincide or separate, be first order, second order or non-mean field second order transitions. The holographic techniques allow us to also perform out of equlibrium computations through these transitions. I'll discuss the implications of these results and an application to the idea of a strongly coupled composite inflaton.

Thu May 12, 2011

5pm Anastasios Petkou (Crete) on "What is Holography?"

Where: 3rd Floor Seminar Room
Calendar: University of Crete HEP Seminars
Description:
Abstract: I present a pedagogical review of the intimate connection between Holography and Hamiltonian Dynamics arguing that it provides new calculational tools for some old problems.

Fri May 13, 2011

3pm Takeshi Morita (Crete) on "Nucleus from string theory"

Calendar: University of Crete HEP Seminars
Description:
Abstract: We find a bound state of baryons in the Sakai-Sugimoto model when the baryon number is large. This bound state can be interpreted as a nucleus in QCD and exhibits several similar properties to the real one. In this derivation, we use only generic properties of D branes and similar bound states would universally appear in holographic QCD. This talk is based on 1103.5688(hep-th).

Tue May 17, 2011

2pm

Joaquim Gomis on "Lifshitz and Schroedinger Algebras and Some of Their Dynamical Realizations"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: We review some non-relativistic algebras like Lifshitz and Schr\" odinger algebras. We construct actions invariant under these symmetries using the non-linear realization method. Some aspects of the supersymmetric case will be also discussed.

University of Crete HEP Seminars

Wed May 18, 2011

5pm

Konstantinos Dimopoulos (Lancaster) on "Where galaxies really come from."

Where: 3rd Floor Seminar Room
Calendar: University of Crete HEP Seminars
Description:
Abstract: The fundamental paradox of the incompatibility of the observed large-scale uniformity of the Universe with the fact that the age of the Universe is finite is overcome by the introduction of an initial a period of superluminal expansion of space, called cosmic inflation. Inflation can also produce the small deviations from uniformity needed for the formation of structures in the Universe such as galaxies. This is achieved by the conjunction of inflation with the quantum vacuum, through the so-called particle production process. This mechanism is explained and linked with Hawking radiation of black holes. The nature of the particles involved is discussed and the case of using massive vector boson fields instead of scalar fields is presented, with emphasis on its distinct observational signatures.

Thu May 19, 2011

5pm

Giorgio Matthiae (Roma) on "Recent results on very high energy cosmic rays"

Where: 3rd Floor Seminar Room
Calendar: University of Crete HEP Seminars
Description:
Abstract: Recent results from the study of very high energy cosmic rays on the energy spectrum of the primary particles, on the mass composition and on the attempts to identify the extragalactic sources will be presented.

Fri May 20, 2011

3pm

Nikolaos Tetradis (UOA) on "The inhomogeneity of the Universe and the cosmological model"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars
Description:
ABSTRACT: The homogeneity of the Universe at horizon distances is an essential element of the cosmological model. Equally important is the role of the inhomogeneities at smaller length scales, whose form is directly related to the cosmological evolution. I discuss various aspects of the role of inohomogeneities, such as: a) the effect of inhomogeneities on the astrophysical data used for the determination of the expansion rate; b) the possibility to generate the acceleration of the cosmological expansion through the embedding of the Universe in an inhomogeneous higher-dimensional space; c) the formation of novel large-scale structures in generalized quintessence models; d) the use of the power spectrum of matter perturbations in the region of Baryonic Acoustic Oscillations (BAOs) in order to differentiate between cosmologica models.

University of Crete HEP Seminars

Wed May 25, 2011

5pm

Christos Kokorelis (Demokritos Research Center) on "Phenomenology of Intersecting Branes"

Where: 3rd Floor Seminar Room
Calendar: University of Crete HEP Seminars
Description:
Abstract: Intersecting branes is a useful theoretical tool in superstring theory, that has been used in recent years for the construction of 4-dimensional models that can unify all fundamental interactions. In this colloquium, we describe recent attempts to construct successfu models of particle physics. The possible experimental signatures of these models may be tested in the Large Hadron Collider (LHC) at CERN.

Fri May 27, 2011

3pm Richard Woodard (Florida) on "Free Gravitons Break de Sitter Invariance"

Where: 2n floor seminar room
Calendar: University of Crete HEP Seminars
Description:
Abstract: The exact scale invariance of the tensor power spectrum in the de Sitter limit implies that gravitons cannot possess a de Sitter invariant propagator, just like massless, minimally coupled scalars. For years the more mathematically inclined have denied this based on explicit de Sitter invariant solutions obtained by two standard procedures: adding covariant gauge fixing functions and analytic continuation techniques. I show that these procedures break down on de Sitter and in the presence of infrared divergences. I also present a correct and explicit solution for the graviton propagator in a standard gauge, exhibiting how it breaks de Sitter invariance. I discuss the implications for the appearance of physical infrared logarithm corrections in quantum gravitational loop computations. This talk is based on two papers with Shun-Pei Miao (Utrecht) and Nick Tsamis (Crete): arXiv:0907.4930 and arXiv:1002.4037.

Thu Jun 2, 2011

5pm

Nicholas Toumbas (Cyprus) on "Holography, Emergent Space and String Cosmology"

Where: 3rd Floor Seminar Room
Calendar: University of Crete HEP Seminars
Description:
Abstract : A large amount of circumstantial evidence indicates that stringy space emerges holographically in special, very quantum mechanical systems. In this talk I will describe aspects of holography with examples from the AdS/CFT correspondence, matrix quantum mechanics and string thermodynamics. Implications for string cosmology are also discussed.

Tue Jun 28, 2011

2pm

Constantinos Skordis (Nottingham) on "Investigation of Modified Newtonian Dynamics"

Where: 2nd floor seminar room
Calendar: University of Crete HEP Seminars

University of Crete HEP Seminars

Thu Jun 30, 2011

5pm

Constantinos Skordis (Nottingham) on "Cosmological puzzles: the Dark Sector and Theories of Gravity"

Where: 3rd Floor Seminar Room
Calendar: University of Crete HEP Seminars
Description:
Abstract : The General Theory of Relativity (GR) is an astoundingaccomplishment:
together with quantum field theory, it is now widelyconsidered to be one of the two pillars of modern physics. The greatsuccess of GR, however, has not stopped alternatives being proposed,some by Einstein himself. The limits of GR have again come into focuswith the emergence of the ‘dark universe’ scenario. For many yearsthere has existed evidence that, if gravity is governed by GR, thereshould be a substantial amount of dark matter in galaxies and clusters.More recently, dark energy has also been found to be required in orderto explain the apparent accelerating expansion of the Universe. Indeed,if GR is correct, it now seems that around 96% of the Universe shouldbe in the form of energy densities that do not interact electromagnetically. Such an odd composition, favoured at such highconfidence, has led some to speculate on the possibility that GR maynot, in fact, be the correct theory of gravity to describe the Universeon the largest scales. The dark universe may be just another signalthat we need to go beyond Einstein’s theory. In this talk, I willdiscuss the difficulties associated with constructing a new theory ofgravity. I will present a compendium of theories of gravity and the extend to which they address the theoretical and observationalrequirements. Finally, I will discuss a Parameterized Framework fortesting gravity on Cosmological scales.