Fachverband Theoretische und Mathematische Grundlagen der Physik (MP)

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Die Mehrzahl der Vorträge handeln von der AdS/CFT-Korrespondenz, von Quanten(feld)theorien und der Quanteninformation. Einige haben einen Bezug zur Gravitationstheorie, wie der Plenarvortrag von Stefan Hollands (Dienstag 11:00 Uhr) über „dynamisched und thermodynamische (In)Stabilität Schwarzer Löcher“. Gemeinsam mit den Fachverbänden GR, EP, AG und UP organisieren wir ein Symposium über „Cosmic Censorship“. Sprecher sind Reinhard Meinel, Jan Sbierski, Frank Eisenhauer und Eric Curiel.

Die junge DPG und die Fachverbände MP und GR bieten erstmalig ein Tutorium für Masterstudenten und Doktoranden an. Dabei bringen Domenico Giulini, Martin Ammon und Klaus Fredenhagen jungen Forschern und Forscherinnen in 90-minütigen Vorträgen aktuelle Forschungsgebiete zwischen Quantenfeldheorie und Gravitation näher.

Die Hauptvorträge von Johanna Erdmenger, Martin Ammon und Charlottte Sleight handeln von der Korrespondenz zwischen Gravitations- und Quantenfeldtheorien. Die Hauptvorträge von Norbert Schuch und Martin Fraas befassen sich mit topologisch geordneten Systemen und dem adiabatischen Theorem. Zwei Sitzungen über Quantenfeldheorie im engeren Sinne beginnen jeweils mit einem Hauptvortrag, gehalten von Giuseppe Ruzzi und Sebastiano Carpi über topologische Ladungen in der QED und Vertex-Operatoren. Ein weiterer Hauptvortrag von Georg Bergner handelt von supersymmetrischen Feldtheorien auf Raumzeit-Gittern. Der DFG-Programmdirektor Stefan Krueckeberg hält einen Vortrag über „Funding Programmes of the DFG“.

Die Mitgliederversammlung unseres FV ist am Dienstag um 12:45 Uhr im Raum SFG 2010. Anschließend hält der erste Sprecher unseres FV, Bodo Geyer, den Hauptvortrag „Zur Historie der Physik in Leipzig und des Fachverbandes TMP“.

Übersicht der Hauptvorträge und Fachsitzungen

(Hörsaal SFG 2010, Poster SFG 2010)

Plenarvorträge

PV I	Mo	11:00–11:45	HS 2010	**Where and when did recent supernovae near Earth explode?** — •Dieter Breitschwerdt, Jenny Feige, Michael Schulreich, Miguel Avillez, Christian Dettbarn
PV II	Mo	11:45–12:30	HS 2010	**What matter(s) at the Event Horizon? Radio Interferometry at highest resolution** — •S. Britzen, A. Zensus, C. Fendt, A. Eckart, V. Karas
PV III	Di	11:00–11:45	HS 2010	**Dynamical vs. Thermodynamical (In-)stabilities of Black Holes** — •Stefan Hollands
PV IV	Di	11:45–12:30	HS 2010	**Satellites for the European GALILEO Navigation System** — •Fritz Merkle
PV V	Di	18:20–18:50	HS 2010	**Funding Programmes of the DFG with special emphasis on Programmes for Early Career Researchers** — •Stefan Krückeberg
PV VI	Mi	20:00–21:00	Altes Rathaus	**Brüche im Weltbild der Physik: Quantenmechanik und Gravitation** — •Domenico Giulini
PV VII	Do	11:00–11:45	HS 2010	**Plasma-based CO2 conversion: Better insights by modeling** — •Annemie Bogaerts
PV VIII	Do	11:45–12:30	HS 2010	**Methanhydrate der Meeresböden, Einfluss auf Klima und Stabilität der Kontinentalränder** — •Gerhard Bohrmann
PV IX	Do	19:00–20:00	Universum	**Was sagen uns Satelliten ueber Wetter und Klima? – Fernerkundung in der Umwelt- und Klimaforschung** — •Justus Notholt

Hauptvorträge

MP 2.1	Mo	14:00–14:45	SFG 2010	**Entanglement in topologically ordered systems: A quantum information perspective** — •Norbert Schuch
MP 3.1	Di	8:30– 9:15	SFG 2010	**Applications of gauge/gravity duality: The example of magnetic impurities** — •Johanna Erdmenger
MP 5.1	Di	13:30–14:00	SFG 2010	**Zur Historie der (Theoretischen) Physik in Leipzig und des Fachverbandes TMP** — •Bodo Geyer
MP 6.1	Di	14:10–14:55	SFG 2010	**Spacelike linearity of the quantum electromagnetic field and topological charges** — •Giuseppe Ruzzi
MP 7.1	Di	16:30–17:15	SFG 2010	**The Adiabatic Theorem for Many-Body Quantum Systems** — Sven Bachmann, Wojciech De Roeck, •Martin Fraas
MP 8.1	Mi	9:00– 9:45	SFG 2010	**Applications of AdS/CFT: From quantum critical theories to entanglement and spacetime** — •Martin Ammon
MP 9.1	Mi	14:00–14:45	SFG 2010	**Non-perturbative investigations of supersymmetry on a space-time lattice** — •Georg Bergner
MP 10.1	Mi	16:30–17:15	SFG 2010	**Conformal nets and vertex operator algebras** — •Sebastiano Carpi
MP 11.1	Do	8:30– 9:15	SFG 2010	**Interactions in Higher-Spin Gravity: a Holographic Perspective** — •Charlotte Sleight

Hauptvorträge des fachübergreifenden Symposiums SYCC

Das vollständige Programm dieses Symposiums ist unter SYCC aufgeführt.

SYCC 1.1	Mo	16:30–17:00	HS 1010	**Determinism, strong cosmic censorship, and the strength of singularities inside black holes** — •Jan Sbierski
SYCC 1.2	Mo	17:00–17:30	HS 1010	**Quasi-stationary collapse scenarios support cosmic censorship** — •Reinhard Meinel
SYCC 1.3	Mo	17:30–18:00	HS 1010	**Approaching the Event Horizon of the Galactic Center Black Hole** — •Frank Eisenhauer
SYCC 1.4	Mo	18:00–18:30	HS 1010	**48 Years of Cosmic Censorship, and Still We Do Not Know What It Is** — •Erik Curiel

Fachsitzungen

MP 1.1–1.3	Mo	8:30–15:00	SFG 2030	**Tutorium in theoretischer Physik (mit jDPG)**
MP 2.1–2.4	Mo	14:00–15:55	SFG 2010	**Quantum Information and Thermodynamics**
MP 3.1–3.4	Di	8:30–10:25	SFG 2010	**AdS/CFT I**
MP 4.1–4.1	Di	11:00–11:45	HS 2010	**Plenarvortrag Stefan Hollands**
MP 5.1–5.1	Di	12:45–14:00	SFG 2010	**Mitgliederversammlung, Geschichte des FV MP**
MP 6.1–6.4	Di	14:10–16:05	SFG 2010	**Quantum Field Theory I**
MP 7.1–7.3	Di	16:30–18:05	SFG 2010	**Quantum Mechanics**
MP 8.1–8.3	Mi	9:00–10:35	SFG 2010	**AdS/CFT II**
MP 9.1–9.4	Mi	14:00–15:55	SFG 2010	**Lattice Theory, Critical Phenomena and Vacuum Structure**
MP 10.1–10.4	Mi	16:30–18:25	SFG 2010	**Quantum Field Theory II**
MP 11.1–11.4	Do	8:30–10:25	SFG 2010	**AdS/CFT III and Quantum Gravity**
MP 12.1–12.5	Do	14:00–15:50	SFG 2010	**Field Theory and Cosmology**
MP 13.1–13.4	Do	16:30–17:50	SFG 2010	**Fields, Bodies, Energies and Induction**
MP 14.1–14.3	Mo	14:00–14:45	SFG 2010	**Posters (Montag-Donnerstag)**

Postersitzung

Die Poster können von Montag Nachmittag bis Donnerstag Abend an den Posterwänden im SFG 2010 angebracht werden.

Mitgliederversammlung Fachverband Theoretische und Mathematische Grundlagen der Physik

Dienstag 12:45–13:30 SFG 2010

- Tagesordnung
- Bericht des Leiters

- Zukünftige Aktivitäten
- Wahl von Leiter und Beirat
- Verschiedenes

MP 1: Tutorium in theoretischer Physik (mit jDPG)

Zeit: Montag 8:30–15:00 Raum: SFG 2030

Tutorium MP 1.1 Mo 8:30 SFG 2030

Globale versus lokale Strukturen von Raumzeiten — •Domenico Giulini — Institut für theoretische Physik, Leibniz Universität Hannover, Germany — ZARM, Universität Bremen, Germany

In meinem Vortrag möchte ich folgenden Fragen nachgehen: Was ist eine Raumzeit? Welche ihrer Strukturen werden durch die Einstein'schen Feldgleichungen bestimmt und welche bleiben unbestimmt? Welche globalen Strukturen setzen wir voraus, um lokale Physik in Form von Anfangswertproblemen zu beschreiben? Sind die globalen Strukturen einer Raumzeit überhaupt beobachtbar?

Pause

Tutorium MP 1.2 Mo 10:15 SFG 2030

Das holographische Prinzip – von Schwarzen Löchern & Verschränkung zur Quantenfeldtheorie — •Martin Ammon — Theoretisch-Physikalisches Institut, Friedrich-Schiller Universität Jena

Was haben Gravitation und stark gekoppelte Quantenfeldtheorien gemeinsam? Beides sind hochaktuelle Forschungsfelder in der theoretischen Physik. Wir werden im Lauf des Vortrags sehen, dass diese beiden Forschungsthemen eng miteinander verzahnt sind. Insbesondere gibt es überraschende Querverbindungen, die unter anderem nahelegen, dass bestimmte Gravitationstheorien und Quantenfeldtheorien die selbe Physik beschreiben, also zwei Seiten ein und derselben Münze sind. Diese neueren Entwicklungen in der theoretischen Physik, die auch unter Schlagwörter wie AdS/CFT Korrespondenz und holographisches Prinzip bekannt sind, ermöglichen tiefere Einsichten in Quantenfeldtheorien und Gravitation. So spielen Quantenaspekte Schwarzer Löcher eine wichtige Rolle für die Beschreibung von Quantenfeldtheorien bei endlicher Temperatur, und die Verschränkungsentropie der Quantenfeldtheorie enthält Informationen über die Raumzeit der dualen Gravitationstheorie.

Mittagspause

Tutorium MP 1.3 Mo 13:00 SFG 2030

Quantenfeldtheorie in gekrümmten Raumzeiten — •Klaus Fredenhagen — II. Institut für Theoretische Physik, Universität Hamburg

Die konventionelle Formulierung der Quantenfeldtheorie, wie man sie in den meisten Lehrbüchern findet, beruht sehr stark auf der Poincare-Symmetrie des Minkowskiraums. Um aber den Einfluss von Gravitationsfeldern berücksichtigen zu können, muss der Minkowskiraum durch eine gekrümmte Raumzeit ersetzt werden, die im allgemeinen keine nichttrivialen Symmetrien besitzt.

Es zeigt sich, dass die algebraische Formulierung der Quantenfeldtheorie, wie sie bereits in den 1960er Jahren entwickelt worden ist, sich besonders gut für eine Formulierung auf generischen Raumzeiten eignet. Die Symmetrie wird dabei durch eine Kovarianzbedingung ersetzt, die die Theorie auf verschiedenen Raumzeiten miteinander verbindet. Zusammen mit einer lokalen Form der positiven Energiebedingung bildet diese Formulierung, die als lokal kovariante Quantenfeldtheorie bezeichnet wird, einen geeigneten Rahmen für die Quantenfeldtheorie unter dem Einfluss äußerer Gravitationsfelder. Dieser kann auch als Ausgangspunkt für eine störungstheoretische Quantengravitation dienen.

Diskussion

MP 2: Quantum Information and Thermodynamics

Zeit: Montag 14:00–15:55 Raum: SFG 2010

Hauptvortrag MP 2.1 Mo 14:00 SFG 2010

Entanglement in topologically ordered systems: A quantum information perspective — •Norbert Schuch — Max-Planck-Institut für Quantenoptik, 85748 Garching, Germany

Topologically ordered systems exhibit a rich variety of unconventional phenomena, such as protected edge physics or excitations with exotic statistics, which are rooted in the complex global entanglement present in these systems. In my talk, I will show how quantum information concepts allow us to construct a succinct description of these systems which explicitly reveals the structure of their entanglement, termed Tensor Network States. I will illustrate the power of this description by two examples: First, I will show how it allows to construct an explicit and general holographic duality relating the entanglement properties of the bulk to the boundary physics of a system, and second, I will demonstrate its power in identifying topological spin liquids, elusive systems which do not order magnetically despite strong interactions yet exhibit global topological order.

10 min. break

MP 2.2 Mo 14:55 SFG 2010

Advances in Lie Systems-Theory for Quantum Dynamics: From Ensembles to Control Design — •Thomas Schulte-Herbrüggen[1], Ville Bergholm[1,2], Gunther Dirr[3], and Robert Zeier[1] — [1]Technical University of Munich (TUM) — [2]University of Helsinki — [3]University of Würzburg

Recently we showed that all Markovian quantum maps can be represented by Lie semigroups. Lie groups and Lie semigroups with their symmetries provide a unified framework to pinpoint the dynamic behaviour of closed and open quantum systems under all kinds of controls.

Here we give a Lie picture of ensemble control in terms of Lie-relatedness within semisimple Lie algebras.

We extend capabilities by combining coherent control with simplest noise controls. Particular light is shed on the limits of reachability under open-loop versus closed-loop control designs.

MP 2.3 Mo 15:15 SFG 2010

A geometric viewpoint on quantum control — •Davide Pastorello — University of Trento and TIFPA, Trento

Quantum mechanics can be geometrically formulated in a symplectic fashion on the projective space (as a Kähler manifold) constructed out from the Hilbert space of the considered quantum theory. Within such a framework quantum dynamics can be represented by the flow of a Hamiltonian vector field in analogy to classical mechanics.

In this talk I propose a new geometric approach to controllability of a n-level quantum system from the viewpoint of geometric structures, exploiting some tools of classical control theory. In particular the notion of the accessibility algebra of classical non-linear systems in affine form can be adapted to study quantum controllability within geometric Hamiltonian formulation of quantum mechanics. Moreover the controllability of a quantum system can be completely characterized in terms of Killing vector fields on the complex projective space w.r.t. Fubini-Study metric.

The talk is mainly based on the following paper: D. Pastorello, A geometric approach to quantum control in projective Hilbert spaces. Accepted for publication in Reports in Mathematical Physics (2016).

MP 2.4 Mo 15:35 SFG 2010

Thermodynamics of anisotropic changes of state — •Falk Koenemann — Im Johannistal 19, 52064 Aachen

The mechanics of solids theory was founded long before the discovery of the First Law of thermodynamics. Elastic deformation is by nature a change of the energetic state in the sense of the First Law; however, the form of the First Law found used in continuum mechanics is not correct. For example, it is not possible to define the work done by shear forces. Thermodynamics is commonly presented in scalars (P,V,T), which implies isotropic boundary conditions. It has been transformed into vector field form (f,r,T), using the theory of potentials (Koenemann 2008). For isotropic boundary conditions the two forms deliver identical results; but the vector field form permits to explore reversible

changes of state under anisotropic boundary conditions. The new approach correctly predicts volume-constancy under elastic pure shear conditions, and dilatancy under simple shear (Poynting effect). It is found that an anisotropically loaded volume of bonded matter is constitutionally expanded due to the work done by the shear forces. The effect amounts to a hitherto unknown thermodynamic state function. It has only one sign, it is always positive. It explains why solids can break under any confining pressure. At the transition from reversible to irreversible behavior a bifurcation is predicted that causes the system to relax into one of two possible geometric configurations with opposite handedness. This bifurcation is the cause of turbulence, triggered by the irreversible resolution of the elastic potential.

Koenemann (2008) Int. J. Modern Physics B 22, 2617

MP 3: AdS/CFT I

Zeit: Dienstag 8:30–10:25 Raum: SFG 2010

Hauptvortrag MP 3.1 Di 8:30 SFG 2010

Applications of gauge/gravity duality: The example of magnetic impurities — •Johanna Erdmenger — Institut für Theoretische Physik und Astrophysik, Julius-Maximilians-Universität Würzburg, Am Hubland, 97074 Würzburg

Gauge/gravity duality, or holography, provides new relations between strongly coupled quantum field theories and gravity. In addition to its intrinsic interest in relation to quantum gravity, gauge/gravity duality also provides novel approaches to studying strongly coupled systems in a wide range of areas within physics.

We illustrate this approach using a recent holographic model for a localized magnetic impurity interacting with a strongly coupled quantum field theory, in generalization of the Kondo model. We calculate the entanglement and impurity entropies and show that they agree with field theory expectations. We also study quantum quenches, which are determined by the complex eigenmodes of the gravity system. The two-point functions for this model display Fano resonances originating from the interplay between a continuum of states and a localized resonance.

[1] J. Erdmenger, C. Hoyos, A. O'Bannon, I. Papadimitriou, J. Probst, J. M. S. Wu: Holographic Kondo and Fano Resonances. arXiv:1611.09368 [hep-th]. [2] J. Erdmenger, M. Flory, C. Hoyos, M.-N. Newrzella, J. M. S. Wu: Entanglement Entropy in a Holographic Kondo Model. Fortsch.Phys. 64 (2016) 109-130 [3] J. Erdmenger, C. Hoyos, A. O'Bannon, J. M. S. Wu: A Holographic Model of the Kondo Effect. JHEP 1312 (2013) 086.

10 min. break

MP 3.2 Di 9:25 SFG 2010

Quantum Quenches in a Holographic Kondo Model — Johanna Erdmenger[1,2], Mario Flory[1,3], •Max-Niklas Newrzella[1], Migael Strydom[1], and Jackson M.S. Wu[4] — [1]Max-Planck-Institut für Physik (Werner-Heisenberg-Institut), Föhringer Ring 6, 80805, Munich, Germany — [2]Institut für Theoretische Physik und Astrophysik, Julius-Maximilians-Universität Würzburg, Am Hubland, 97074 Würzburg, Germany — [3]Institute of Physics, Jagiellonian University, Lojasiewicza 11, 30-348 Kraków, Poland — [4]Department of Physics and Astronomy, University of Alabama, Tuscaloosa, AL 35487, USA

We apply gauge/gravity duality to study the non-equilibrium dynamics induced by quenching the interaction parameter between a magnetic impurity and a strongly coupled system of fermions. In the holographic limit, this model exhibits a phase transition at a critical temperature, below which the impurity is partially screened. We investigate the quasinormal modes in both phases, and comment on the dynamical critical behaviour at around the critical point.

MP 3.3 Di 9:45 SFG 2010

Non-local observables at finite temperature in AdS/CFT — •Nina Miekley[1,2] and Johanna Erdmenger[1,2] — [1]Julius-Maximilians-Universität Würzburg, Germany — [2]Max-Planck-Institut für Physik, München, Germany

The AdS/CFT correspondence relates strongly coupled field theories to theories containing gravity. One interesting aspect are non-local observables, for instance the two-point function, the Wilson loop and the entanglement entropy. Their dual descriptions are associated to minimal surfaces.

The aforementioned observables are known in the form of power-series for d-dimensional Schwarzschild-AdS. Starting from this result, we derive their closed, analytic form. This simplified form allows deeper insights into the behaviour of these non-local observables.

MP 3.4 Di 10:05 SFG 2010

Vaidya and Holography in the far from Equilibrium Regime — •Michael Florian Wondrak[1,2], Matthias Kaminski[3], Piero Nicolini[1,2], and Marcus Bleicher[1,2] — [1]Frankfurt Institute for Advanced Studies (FIAS), Frankfurt am Main, Germany — [2]Institut für Theoretische Physik, Johann Wolfgang Goethe-Universität Frankfurt, Frankfurt am Main, Germany — [3]Department of Physics and Astronomy, University of Alabama, Tuscaloosa, USA

The so-called gauge/gravity duality provides a link between gravitational and quantum physics, more specifically between quantities in an asymptotic Anti-de Sitter spacetime and its dual conformal field theory on the boundary (AdS/CFT correspondence). The duality can be used to obtain observables in a strongly coupled system by addressing the analogous problem in the associated weakly curved gravitational theory.

This correpondence turned out to be a successful means to calculate transport coefficients of (non-)conformal field theories, which for example lead to a prediction of the low shear viscosity over entropy density ratio later measured in heavy ion collisions. Near equilibrium quantities are typically derived from perturbations of static gravitational background geometries. In order to study far from equilibrium properties on the field theory side, we work with a generalized time-dependent Vaidya background on the gravity side: A black brane which grows due to the collapse of infalling null matter in the presence of electromagnetic fields. This can find application, e.g., in the description of heavy ion collisions.

MP 4: Plenarvortrag Stefan Hollands

Zeit: Dienstag 11:00–11:45 Raum: HS 2010

Plenarvortrag MP 4.1 Di 11:00 HS 2010

Dynamical vs. Thermodynamical (In-)stabilities of Black Holes — •Stefan Hollands — Institut für Theoretische Physik, Universität Leipzig, Brüderstr. 16, Leipzig D-04103

Black holes have long been known to have properties that are in striking analogy to the zeroth, first, and second law of thermodynamics. It is an intriguing question whether further analogies of this nature also exist in the context of stability questions. For instance, if an ordinary laboratory type system possesses a negative heat capacity (positive eigenvalue of the Hessian of the entropy), then a homogeneous equilibrium state of the system cannot be stable, but will turn into another one with an inhomogeneous energy density. Do statements of this nature still hold for black holes? In this talk, I will show that the answer to this question is in the affirmative, and that thermodynamic considerations in fact give useful information about the stability properties of highly complicated black hole solutions that are difficult to extract by other, more explicit, methods.

MP 5: Mitgliederversammlung, Geschichte des FV MP

Zeit: Dienstag 12:45–14:00 Raum: SFG 2010

Mitgliederversammlung des FV, SVG 2010

Hauptvortrag MP 5.1 Di 13:30 SFG 2010

Zur Historie der (Theoretischen) Physik in Leipzig und des Fachverbandes TMP — •Bodo Geyer — Asternweg 48, 04209 Leipzig

Nach langjähriger Beschäftigung mit der Geschichte der Physik an der Universität Leipzig seit ihrer Gründung sei mit ein persönlicher Blick zurück auf einige Etappen in der Entwicklung vor allem der theoretischen und mathematischen Physik in Leipzig erlaubt. Besonderes Augenmerk gilt dabei der Zeit zwischen 1945 und 1990, sodann wie und mit welcher Intention es danach zur Gründung des FV *Theoretische und Mathematische Grundlagen der Physik* unter diesem Namen kam.

MP 6: Quantum Field Theory I

Zeit: Dienstag 14:10–16:05 Raum: SFG 2010

Hauptvortrag MP 6.1 Di 14:10 SFG 2010

Spacelike linearity of the quantum electromagnetic field and topological charges — •Giuseppe Ruzzi — Dipartimento di Matematica, Universita‘ di Roma "Tor Vergata", Via della ricerca scienitfica 1, 00133 Roma, Italy

A general analysis of the observable structure of the quantum electromagnetic field reveal the presence of a (possibly) new topological charge. This is related to the possibility to give a covariant quantization of the electromagnetic potential, in a Hilbert space, whose the commutator on a pair of mollifying functions localized in a certain topologically non-trivial spacelike separated regions does not vanish, rather it is a central element giving rise to a topological charge.

We shall see that such a quantization is possible if the field is "spacelike linear" on mollifying functions, a weaker, but physically reasonable, form of linearity. We shall give concrete examples also in the presence of electric currents,

Finally, we briefly discuss the status of topological charges in theories with several types of electromagnetic fields, which appear in the short distance (scaling) limit of asymptotically free non-Abelian gauge theories.

The talk is based on two joint works with D. Buchholz, F. Ciolli and E. Vasselli

1) "The universal C*-algebra of the electromagnetic field" LMP (2016), arXiv:1506.06603 2) "The universal C*-algebra of the electromagnetic field II. Topological charges and spacelike linear fields" . arXiv:1610.03302, it will appear on LMP

10 min. break

MP 6.2 Di 15:05 SFG 2010

The D-CTC condition in quantum field theory — •Rainer Verch — Institut für Theoretische Physik, Universität Leipzig

The D-CTC condition has originally been proposed by David Deutsch as a condition on states of a quantum communication network that contains "backward time-steps" in some of its branches. It has been argued that this is an analogue for quantum processes in the presence of closed timelike curves (CTCs). The unusual properties of states of quantum communication networks that fulfill the D-CTC condition have been discussed extensively in recent literature. In this work, the D-CTC condition is investigated in the framework of quantum field theory in the local, operator-algebraic approach due to Haag and Kastler. It is shown that the D-CTC condition cannot be fulfilled in states which are analytic for the energy, or satisfy the Reeh-Schlieder property, for a certain class of processes and initial conditions. On the other hand, if a quantum field theory admits sufficiently many uncorrelated states across acausally related spacetime regions (as implied by the split property), then the D-CTC condition can always be fulfilled approximately to arbitrary precision. As this result pertains to quantum field theory on globally hyperbolic spacetimes where CTCs are absent, one may conclude that interpreting the D-CTC condition as characteristic for quantum processes in the presence of CTCs could be misleading, and should be regarded with caution. This is joint work with J. Tolksdorf, see arXiv:1609.01496.

MP 6.3 Di 15:25 SFG 2010

Feynman Propagators — •Daniel Siemssen — Department of Mathematical Methods in Physics, Faculty of Physics, University of Warsaw

The Klein-Gordon equation has several interesting and relevant propagators (also called Green's functions or two-point functions), e.g., the forward/backward propagators and the Feynman propagator. In this talk I will discuss an approach to construct propagators on curved spacetimes. This approach can also be applied for non-smooth metrics and when external electromagnetic fields are present. I will then show that in some situations the Feynman propagator can be constructed as the limit of the resolvent of the Klein-Gordon operator. This is closely related to the problem of the self-adjointness of the Klein-Gordon operator.

MP 6.4 Di 15:45 SFG 2010

Superconformal Chern-Simons Mater Theory in Lorentzian Curved Manifolds — •Mojtaba Taslimitehrani — Max Planck institute for Mathematics in the Sciences, Leipzig, Germany

We study the N=6 superconformal Chern-Simons field theory (the ABJM theory) conformally coupled to a Lorentzian, curved background spacetime. To support rigid supersymmetry, such backgrounds have to admit twistor spinors. At the classical level, the symmetry of the theory can be described by a conformal symmetry superalgebra. We investigate the question of self-consistency of this theory which is closely related to the realization of the rigid conformal supersymmetry and local gauge symmetry at the quantum level. By carefully analyzing the relevant cohomology class of a suitable BRST differential in curved space-time, we show that there exists a renormalization scheme in which the full classical symmetries are preserved at the quan-

tum level. This leads to an algebraic proof that the beta-function of this theory vanishes to all orders in perturbation theory.

MP 7: Quantum Mechanics

Zeit: Dienstag 16:30–18:05 Raum: SFG 2010

Hauptvortrag MP 7.1 Di 16:30 SFG 2010

The Adiabatic Theorem for Many-Body Quantum Systems — Sven Bachmann[2], Wojciech De Roeck[1], and •Martin Fraas[1] — [1]KU Leuven, Leuven, Belgium — [2]LMU, Munich, Germany

The first proof of the quantum adiabatic theorem was given as early as 1928. Today, this theorem is increasingly applied in a many-body context, e.g. in quantum computing, linear response theory for QHE, and in control protocols for artificial states of matter. In this setup, the rate of variation of local terms is indeed small compared to the gap, but the rate of variation of the total, extensive Hamiltonian, is not. Therefore, applications to many-body systems are not covered by the proofs and arguments in the literature. We prove a version of the adiabatic theorem for gapped ground states of quantum spin systems, under assumptions that remain valid in the thermodynamic limit. A direct consequence is a mathematical proof of the Kubo linear response formula for a broad class of interacting systems.

10 min. break

MP 7.2 Di 17:25 SFG 2010

Lossless quantum compression of quantum measurements — •Andreas Bluhm and Michael M. Wolf — Technische Universität München

In this work, we investigate the task of compressing quantum measurements in the Heisenberg picture with respect to their Hilbert space dimension. This serves to minimize data storage requirements. In our analysis, we allow for an arbitrary classical side channel and give a concrete procedure to determine the minimal dimension that we can compress to. Furthermore, we show that for two generic binary measurements compression is impossible, whereas for two von Neumann measurements we can reduce to dimension 2. For the latter case, we give a quantum channel with classical side information which achieves this compression.

MP 7.3 Di 17:45 SFG 2010

On the Measurement Problem and the EPR Paradox — •Eugen Muchowski — Vaterstetten

After a polarization measurement with photons in singlet state we know for certain the photons were in the measured state prior to measurement. Photons in singlet state do therefore not exhibit action at a distance. The EPR paradox with entangled photons has been challenged. It was also shown why quantum mechanics infringes Bells inequality.

MP 8: AdS/CFT II

Zeit: Mittwoch 9:00–10:35 Raum: SFG 2010

Hauptvortrag MP 8.1 Mi 9:00 SFG 2010

Applications of AdS/CFT: From quantum critical theories to entanglement and spacetime — •Martin Ammon — Theoretisch-Physikalisches Institut,Friedrich-Schiller-Universität Jena

Gauge/Gravity Duality - also referred to as AdS/CFT correspondence or just holography - is an attractive new concept originating from string theory. On one hand, it sheds new light on quantum gravity, while on the other, it provides tools for studying strongly coupled systems in a variety of areas in physics. These include particle, heavy ion and condensed matter physics.

After a short introduction into the basic building blocks of the AdS/CFT correspondence I sketch two exciting applications: (1) topological phases within strongly coupled quantum field theories using holography as well as (2) entanglement entropy and its relation to spacetime geometry within string theory.

10 min. break

MP 8.2 Mi 9:55 SFG 2010

Phase diagrams of holographic superfluids at finite superfluid velocity — Martin Ammon and •Markus Gardemann — Theoretisch-Physikalisches Institut, Friedrich-Schiller-Universität Jena, 07743 Jena, Germany

The AdS/CFT correspondence is a novel approach to strongly coupled field theories. With this tool we examine the phase diagram of a particular superfluid at finite superfluid velocity. In particular we study the Goldstone modes arising due to spontaneous symmetry breaking. Within the model the sound velocity becomes negative for large enough superfluid velocity signalling an instability. Since the instability is strongest at finite wavelength, this indicates the existence of an inhomogeneous or striped condensed phase for large superfluid velocity. We explicitly construct the striped phase and extract some of the thermodynamic properties.

MP 8.3 Mi 10:15 SFG 2010

Holographic quenches and anomalous transport — Martin Ammon[1], •Sebastian Grieninger[1], Amadeo Jiménez-Alba[1], Rodrigo P. Macedo[1], and Luis Melgar[2] — [1]Theoretisch-Physikalisches Institut, Friedrich-Schiller-Universität Jena, 07743 Jena, Germany — [2]Blackett Laboratory, Imperial College London, SW7 2AZ, U.K.

We study the response of the chiral magnetic effect due to continuous quenches induced by time dependent electric fields within holography. Holography is a novel tool to study strongly coupled field theories, i. e. their non equilibrium properties. Concretely, we consider a holographic model with dual chiral anomaly and compute the electric current parallel to a constant, homogeneous magnetic field and a time dependent electric field in the probe approximation. We explicitly solve the PDEs by means of pseudospectral methods in spatial and time directions and study the transition to an universal "fast" quench response. We highlight the existence of Landau level resonances in the electrical conductivity parallel to a magnetic field at finite frequency and show explicitly that these only appear in presence of the anomaly. We show that the existence of these resonances induces, among others, a long-lived AC electric current once the electric field is switched off.

MP 9: Lattice Theory, Critical Phenomena and Vacuum Structure

Zeit: Mittwoch 14:00–15:55 Raum: SFG 2010

Hauptvortrag MP 9.1 Mi 14:00 SFG 2010

Non-perturbative investigations of supersymmetry on a space-time lattice — •Georg Bergner — Institute of Theoretical Physics, Friedrich-Schiller-University Jena, Max-Wien-Platz 1, D-07743 Jena

In this talk I will discuss the motivations, difficulties and progress in the study of supersymmetric gauge theories with numerical methods on a space-time lattice. As an interesting example I will review in more detail the results for N=1 supersymmetric Yang-Mills theory. I will conclude with a summary of the current status and the prospects for the future of the general numerical lattice investigations of supersymmetric theories.

10 min. break

MP 9.2 Mi 14:55 SFG 2010

$\mathcal{N} = 1$ supersymmetric SU(3) Yang-Mills theory on the lattice — •Marc Steinhauser, Andreas Wipf, André Sternbeck, and Björn Wellegehausen — Theoretisch-Physikalisches Institut, Friedrich-Schiller-Universität Jena, 07743 Jena, Germany

We investigate the fourdimensional SU(3) Yang-Mills theory with $\mathcal{N} = 1$ supersymmetry. This theory contains meson-like gluinoballs, gluino-glueballs and pure glueballs as bound states. In my talk, I will present first results with focus on particle masses. Another part of our investigation aims at the understanding of the chiral symmetry and its breaking mechanism. A fine tuning of the bare gluino mass is necessary to ensure the restauration of the supersymmetry and the chiral symmetry in the continuum limit. After setting the scale, we can relate the dimensionless lattice quantities to physical observables and compare them to their counter-parts in quantum chromodynamics.

MP 9.3 Mi 15:15 SFG 2010

Gross-Neveu-Yukawa models at criticality — •Benjamin Knorr — Theoretisch-Physikalisches Institut, Friedrich-Schiller-Universität Jena

We present new estimates for critical quantities of Gross-Neveu-Yukawa models, obtained with nonperturbative renormalisation group techniques. These models play a central role in many areas of physics, e.g. in the description of graphene or as an effective low energy model to QCD.

MP 9.4 Mi 15:35 SFG 2010

Non-perturbative methods in QFT and the unstable vacuum — •Ibrahim Akal — Theory Group, Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany

In this talk we will present some non-perturbative methods in quantum field theory. Various applications will be adressed, mainly in the context of unstable vacua under extreme conditions.

MP 10: Quantum Field Theory II

Zeit: Mittwoch 16:30–18:25 Raum: SFG 2010

Hauptvortrag MP 10.1 Mi 16:30 SFG 2010

Conformal nets and vertex operator algebras — •Sebastiano Carpi — University of Chieti-Pescara, Italy

The study of conformal field theory (CFT) in two space-time dimensions has found applications to different areas of physics and mathematics. Chiral CFTs, namely CFTs on the circle, are the building blocks of CFT. We have two different axiomatic approaches to chiral CFT. The conformal net approach is based on the theory of operator algebras in Hilbert spaces (C^*-algebras and von Neumann algebras) and it is the chiral CFT version of algebraic quantum field theory (AQFT). On the other hand, the vertex operator algebra (VOA) approach approach is based on an algebraic reformulation of the relevant properties of conformal invariant quantum fields on the circle. In this talk I will discuss various recent results on the connections between these two approaches.

10 min. break

MP 10.2 Mi 17:25 SFG 2010

Rekursive Konstruktion der Operatorproduktentwicklung für nichtabelsche Eichtheorien — •Markus B. Fröb[1] und Jan Holland[2] — [1]Department of Mathematics, University of York, YO10 5DD, Heslington, York, UK — [2]Springer-Verlag, Tiergartenstraße 17, 69121 Heidelberg

Als zustandsunabhängige Entwicklung enthält die Operatorproduktentwicklung (OPE) wichtige Informationen zur algebraischen Struktur einer Quantenfeldtheorie. Wir geben eine explizite Formel für euklidische nichtabelsche Eichtheorien an, mithilfe derer die Koeffizienten der OPE in der Störungstheorie rekursiv berechnet werden können, ausgehend von der freien Theorie und der Wahl eines Wechselwirkungsoperators. Wir leiten weiterhin Wardidentitäten für die Koeffizienten ab, die die Eichinvarianz der OPE garantieren, und geben eine analoge rekursive Konstruktion für den Quanten-BRST-Operator an, durch den diese Identitäten ausgedrückt werden.

Die rekursiven Formeln sind vollständig renormiert, in einem BPHZ-ähnlichen Schema. Sie hängen nur von Koeffizienten niedrigerer Ordnung ab, und zeigen so explizit die Zustandsunabhängigkeit der OPE. Mit ihrer Hilfe können fernerhin weitere Eigenschaften der OPE, wie z.B. die Assoziativität, gezeigt werden.

Der Beitrag basiert auf arXiv:1603.08012.

MP 10.3 Mi 17:45 SFG 2010

Quantum backflow in scattering situations — •Daniela Cadamuro — TU München, Garching, Deutschland

Measurable quantities that have positive values in classical dynamical systems need not to be positive in quantum theory. For example, consider a free quantum mechanical particle in 1 dimension. There are quantum states in which the particle's velocity is positive with probability 1, but where the probability flux for its position is locally negative; that is, while its velocity points to the right, the particle travels to the left. These effects are however small and limited in space and time by certain lower bounds, which are called "quantum inequalities". Similar effects also appear for a particle whose motion is governed by a Schroedinger equation with a certain class of potentials. The talk will present some recent results and work in progress on this topic.

MP 10.4 Mi 18:05 SFG 2010

Multi-Particle Scattering in Wedge-Local Quantum Field Theories — •Maximilian Duell and Wojciech Dybalski — Technische Universität München

I will present a construction of multi-particle scattering states which is suitable for a large class of wedge-local Quantum Field Theories, including e.g. Grosse-Lechner-type models. Scattering theory in this setting has previously been developed only up to the two-particle level, and a generalization to higher particle numbers was not expected for apparent geometric reasons.

MP 11: AdS/CFT III and Quantum Gravity

Zeit: Donnerstag 8:30–10:25 Raum: SFG 2010

Hauptvortrag MP 11.1 Do 8:30 SFG 2010

Interactions in Higher-Spin Gravity: a Holographic Perspective — •Charlotte Sleight — Université Libre de Bruxelles, Brussels, Belgium

A long standing problem in theoretical physics is understanding if gauge fields of spin s > 2 can interact in a consistent manner. In this talk we review how the AdS/CFT correspondence (holography) seems to naturally imply the existence of consistent interacting theories of higher-spin gauge fields, which are believed to capture the high-energy regime of string theory. We also briefly discuss recent results which employ AdS/CFT to construct a possible non-linear action for higher-spin theories on an AdS background, free from auxiliary fields.

10 min. break

MP 11.2 Do 9:25 SFG 2010

The phases of higher spin black holes — •Ignacio Reyes[1,2], Max Banados[2], Gustavo During[2], and Alberto Faraggi[2] — [1]Institut für Theoretische Physik und Astrophysik, Julius-Maximilians-Universität Würzburg, Germany — [2]Pontificia Universidad Catolica de Chile, Santiago, Chile

We study the thermodynamic phase diagram of three-dimensional sl(N,R) higher spin black holes. By analyzing the semi-classical partition function we uncover a rich structure that includes Hawking-Page transitions to the AdS3 vacuum, first order phase transitions among black hole states, and a second order critical point. Our analysis is explicit for N = 4 but we extrapolate some of our conclusions to arbitrary N. In particular, we argue that even N is stable in the ensemble under consideration but odd N is not.

MP 11.3 Do 9:45 SFG 2010

Interfacing non-perturbative quantum gravity and AdS/CFT — •Norbert Bodendorfer — LMU München

We report on ongoing research on using non-perturbative quantum gravity in the context of AdS/CFT.

MP 11.4 Do 10:05 SFG 2010

Shape Dynamics in Loops from a Conformal Barbero-Immirzi Parameter — •Patrick Wong — Universität zu Köln, Cologne, Germany

The Barbero-Immirzi parameter of loop quantum gravity is a one parameter ambiguity of the theory whose interpretation is not universally agreed upon. It is an inherent characteristic of the quantum theory as it appears in the spectra of geometric operators. An interesting realization is that promoting the Barbero-Immirzi parameter to play the role of a conformal transformation leads to a system which can be identified as analogous to the linking theory of shape dynamics. A three-dimensional gravitational gauge connection is then constructed within the linking theory in a manner analogous to loop quantum gravity, thereby facilitating the application of the established procedure of loop quantization to a shape dynamical theory.

MP 12: Field Theory and Cosmology

Zeit: Donnerstag 14:00–15:50 Raum: SFG 2010

MP 12.1 Do 14:00 SFG 2010

NLS breathers, rogue waves, and solutions of the Lyapunov equations with Jordan blocks — •Folkert Müller-Hoissen and Oleksandr Chvartatskyi — MPI for Dynamics and Self-Organization, Göttingen

The infinite families of Peregrine, Akhmediev and Kuznetsov-Ma breather solutions of the focusing Nonlinear Schrödinger (NLS) equation are obtained via a matrix version of the Darboux transformation, with a spectral matrix of the form of a Jordan block. The structure of these solutions is essentially determined by the corresponding solution of the Lyapunov equation. In particular, regularity follows from properties of the Lyapunov equation.

MP 12.2 Do 14:20 SFG 2010

Gauged Baby Skyrme Model with and without Chern-Simons Term — •Yakov Shnir[1] and Albert Samoilenko[2] — [1]Joint Institute for Nuclear Research Bogoliubov Laboratory of Theoretical Physics — [2]Belarus State University

The properties of the multisoliton solutions of the U(1) gauged modification of the 2+1 dimensional planar Skyrme model with and without Chern-Simons term are investigated numerically. Coupling to the Chern-Simons term allows for existence of the electrically charged solitons which may also carry magnetic fluxes. Two particular choices of the potential term are considered: (i) the weakly bounded potential and (ii) the double vacuum potential. In the absence of the gauge interaction in the former case the individual constituents of the multisoliton configuration are well separated, while in the latter case the rotational invariance of the configuration remains unbroken. We analyze the dependency of the structure of the solutions, the energies, angular momenta, electric and magnetic fields of the configurations on the gauge coupling constant g, and the electric potential. It is found that, generically, the coupling to the Chern-Simons term strongly affects the usual pattern of interaction between the skyrmions, in particular the electric repulsion between the solitons may break the multisoliton configuration into partons. On the other hand, in the strong coupling limit the coupling to the gauge field results in effective recovering of the rotational invariance of the configuration and both the magnetic flux and the electric charge of the solutions become quantized, although they are not topological numbers.

MP 12.3 Do 14:40 SFG 2010

On particle interpretation in homogeneous cosmology — •Zhirayr Avetisyan — Department of Mathematics, UCL

We work in the framework of quantum field theory in curved spacetimes. In absence of gravity - in Minkowski spacetime - the notion of an elementary particle is well-understood. Several different interpretations are possible that are naturally equivalent. In a curved spacetime, however, these interpretations become less intuitive and their equivalence on a mathematical level is not clear yet. In homogeneous cosmology the spacetime is assumed spatially homogeneous. This allows one to consider somewhat obscure generalizations of particle interpretations known to work in the flat case. One such interpretation comes from mode decomposition of a hyperbolic field equation, each mode roughly representing an elementary particle state with fixed evolution. Another particle interpretation is a reminiscent of Wigner's classification: every unitary irreducible representation of the isometry group corresponds to an elementary particle state with fixed momentum but unclear energy. We will discuss Peter-Weyl theorem from harmonic analysis and see how it may help us to achieve a mathematical identification of these two interpretations on general grounds.

10 min. break

MP 12.4 Do 15:10 SFG 2010

Geodesic motion and the magnitude-redshift relation on cosmologically symmetric Finsler spacetimes — •Manuel Hohmann[1] and Christian Pfeifer[1,2,3] — [1]Physikalisches Institut, Universität Tartu, Estland — [2]Institut für theoretische Physik, Universität Hannover — [3]Zentrum für angewandte Raumfahrttechnologie und Mikrogravitation (ZARM), Universität Bremen

We consider the most general Finsler spacetime geometry with cosmological symmetry, i.e., six Killing vector fields for homogeneity and isotropy. Within this background, we discuss the geodesic motion of both massive test bodies and light. Using adapted coordinates on the tangent bundle, we derive the geodesic equation and a full set of constants of motion, which allow us to characterize geodesics. As an application, we derive the magnitude-redshift relation for Finsler cosmology. We apply our findings to several kinematic models of Finsler spacetimes.

MP 12.5 Do 15:30 SFG 2010

Light propagation in local and linear media: Fresnel-Kummer wave surfaces with 16 singular points — Alberto Favaro[1] and •Friedrich W. Hehl[2] — [1]Dept. Physics, Imperial College, London and ASI Data Science, London — [2]Universität zu Köln and University of Missouri, Columbia

The Fresnel wave surfaces of transparent biaxial media have 4 singular points. In more general media, the number of singularities can exceed 4. In fact, a highly symmetric linear material is proposed whose Fresnel surface exhibits 16 singular points. For every linear material, the dispersion equation is quartic. Thus, 16 is the maximum number of isolated singularities. The identity of Fresnel and *Kummer surfaces,* which holds true for media with a certain symmetry (zero skewon piece), provides an elegant interpretation of the results. We describe a metamaterial for our linear medium with 16 singular points. It is found that an appropriate combination of metal bars, split-ring resonators, and magnetized particles can generate the correct permittivity, permeability, and magnetoelectric moduli. [1] H. Knörrer, Die Fresnelsche Wellenfläche, in: Math. Miniaturen, Vol. 3, p. 115 (Birkhäuser, Basel, 1986). [2] A. Favaro, F. W. Hehl, Phys. Rev. A 93, 013844 (2016).

MP 13: Fields, Bodies, Energies and Induction

Zeit: Donnerstag 16:30–17:50 Raum: SFG 2010

MP 13.1 Do 16:30 SFG 2010

Primär-Theorie des Kosmos — •Gert Röder — Akrotel-Akademie, 82065 Baierbrunn, Bahnhofstr. 20 a

Das Viel-Körper-Problem ist ein ungelöstes Grundlagen-Problem der Physik und auch der anderen Wissenschaften.

Schon in der klassischen Physik liefert die Himmelsmechanik ein typisches Beispiel. Die Bewegungsgleichungen sind seit Newton bekannt, aber trotz großer Anstrengung mit bisherigen Methoden nicht lösbar.

Deshalb wurden die neuen psycho-physischen Wissenschaften entwickelt. Dies eröffnet eine neue Perspektive und mit den Hekkaidekionen, einer 16-dimensionalen hyperkomplexen Algebra, wurden neue mathematische Methoden geschaffen.

Mit diesen Methoden kann das System von 3 Himmelskörpern (z.B. Sonne-Erde-Mond) in unabhängige Zwei-Körper-Systeme (Primär-Teilchen) zerlegt werden. zwischen denen keine Wechselwirkung besteht. Das Ergebnis ist spektakulär:

die Primär-Teilchen liegen hinter der Wahrnehmungsgrenze (hinter den Kulissen), sie sind physikalisch nicht meßbar, aber ihre Position kann mathematisch genau berechnet werden.

aus dem Anfangszustand der physikalischen Teilchen kann die Position der Primär-Teilchen zu einem beliebigen Zeitpunkt in einem Schritt berechnet werden, mit der Hekkaidekionen-Transformation kann daraus die Position der physikalischen Teilchen in einem Schritt berechnet werden.

eine große neue Energie wurde entdeckt. Die Erschließung bringt großen Nutzen.

MP 13.2 Do 16:50 SFG 2010

Dreidimensionale analytische Berechnung der magnetischen Induktion einer Elektrischen Maschine — •Roland Adam Renz — Treppendorf 38 D-96138 Burgebrach

Für den Anwendungsbereich der Elektrischen Maschinen wird die allgemeine Helmholtzgleichung durch die Ver- nachlässigung der elektrischen Verschiebungsstromdichte vereinfacht. Dadurch entsteht aus der vereinfachten Helmholtzgleichung eine elliptische Differentialgleichung, die für den eingeschwungenen Zustand gilt.

Als analytische Lösung dieser elliptischen DGL wird eine konvergente Eigenwertentwicklung gefunden. Wesentliche Merkmale dieser Eigenwertentwicklung sind zwei reelle Eigenwerte und die Integrationskonstante der Übertragungsfunktion. Die Übertragungsfunktion ist aus zwei Hankelfunktionen konstruiert. Ferner gilt die gefundene Eigenwertentwicklung beliebig für Gleichstrom- oder Wechselstrombetrieb der Drehfeldmaschine.

Die gefundenen reellen Eigenwerte repräsentieren eine räumliche elektromagnetische Dämpfung der magnetis- chen Induktion. Dadurch ist die Verteilung der magnetischen Induktion lokal begrenzt, so wie es in der Praxis der Elektrischen Maschinen tatsächlich der Fall ist. Im Modell existieren keine sich ablösenden Wellen.

Alle physikalischen Kennwerte des geraden elektrischen Drahtes werden dadurch gefunden, dass man eine Elektrische Maschine definert, deren Polpaarzahl gegen Null strebt. Die axiale Länge der Elektrischen Mas- chine oder des einfachen Drahtes kann dabei beliebig gewählt werden.

MP 13.3 Do 17:10 SFG 2010

Allgemeine einheitliche Grundlagen der Natur - dargelegt und bezeugt in klarer Kieler Feldtheorie — •Hans Körber — Kiel, Deutschland

Auf der Grundlage eines neuen Elektron-Modells (des intrinsisch bewegten Kieltrons) werden Antworten aufs Warum zu Naturgesetzen und in der Physik bisher offene Fragen gefunden sowie nachvollziehbar begründet. Es zeigt sich, daß allein elementare elektrische Felder zur Beschreibung und Deutung physikalischer Phänomene die Basis bilden. Instantan erzeugte Magnetfelder enthalten die Selbstenergie der Elektronen. Erstmals erfahren bspw Kraft, Gravitation, Photon (kein zwiespältiges Verhalten), Lorentz-, Zentripetal- und -fugalkraft, Anomalie magnetischen Moments schlüssige Interpretationen. Das Bohrsche Magneton wird klassisch hergeleitet. Die Feinstrukturkonstante ist eine Radienproportion. Vermeintliche Zeitdilatation ist gedehnte Zeitanzeige. Photonen haben kein magnetiches Moment und werden beim Sonnenvorbeiflug nicht durch Schwerkraft, sondern Kollisionen abgelenkt. Primär existiert rational betrachtet und plausibel nur eine Grundkraft, die elektrische.

MP 13.4 Do 17:30 SFG 2010

Emission and Regeneration UFT — •Osvaldo Domann — Stephanstr. 42, D- 85077 Manching

The SM defines for each force a different field resulting the electric, magnetic, weak, strong and gravitation fields. Based on a space-like representation of Subatomic Particles (SPs) as Focal Points of rays of Fundamental Particles (FPs) that extend over the whole space, a theory is presented where all known forces are derived from one single field. FPs store the energy of the SPs as rotations defining angular momenta allowing the description of the interactions between SPs as the interactions between the angular momenta of their FPs. The main finding of the approach is that many concepts introduced by the SM like gluons, gravitons, dark mater, dark energy, equivalence principle, etc. are not required. Another important finding is the interaction of light with the measuring instruments which together with the emission of light with speed *c* relative to its source allows the deduction of all relevant relativistic equations without paradoxes and the need of unphysical concepts like time dilation and length contraction. More at www.odomann.com

MP 14: Posters (Montag-Donnerstag)

Zeit: Montag 14:00–14:45 Raum: SFG 2010

MP 14.1 Mo 14:00 SFG 2010

Spin irreduzibler Lorentz-Tensoren — •Stefan Neumeier — Institut für Theoretische Physik, Universität Leipzig

Die irreduziblen Darstellungen der eigentlichen orthochronen Lorentz-Gruppe $SO_0(1,3)$ lassen sich bekanntlich in Beziehung zu gewissen irreduziblen Darstellungen der Überlagerungsgruppe $SL(2,C)$ setzen, welche wiederum durch Paare nichtnegativer halbganzer Zahlen charakterisiert sind. So kann einem irreduziblen Lorentz-Tensor ein solches Paar als *Spin* zugeordnet werden. Skalare haben den Spin $(0,0)$, Vektoren den Spin $(\frac{1}{2},\frac{1}{2})$ und spurlose totalsymmetrische Tensoren 2. Stufe den Spin $(1,1)$.

Es scheint bis jetzt keine systematische Antwort auf die elementare Frage zu geben, welchen Spin ein vorgelegter irreduzibler Tensor höherer Stufe habe. Ich gebe einige Resultate hierzu an.

MP 14.2 Mo 14:00 SFG 2010

Charakteristika von Photonen, Details ihrer Energiedosierung u a Probleme — •Hans Körber — Kiel, Deutschland

Photonen (alias Lichtquanten) entstehen z B beim Bahnwechsel abwärts von Elektronen in ihrem Atomumlauf. Was genau ist jedoch die Ursache für die jeweils abgestrahlte Energiemenge? Erhöht sich dadurch wirklich der Massendefekt? Ist das Ganze weniger als die Summe der Teile? Warum wurde das Pariser Urkilogramm leichter? Und - was frequentiert bei Photonen? Könnten auch durch Quantensprung abwärts Photonen entstehen? Gravitiert Licht beim Sonnenvorbeiflug? Gibt es eine Rotverschiebung? Tritt beim Transport von Uhren Zeitdilatation ein? Gehen selbst präziseste Atomuhren prinzipiell ungenau? Viele unterschiedlichste(?) Fragen - aber eine nachvollziehbare Deutung der Phänomene bspw im Wasserstoff-Atom liefert zusammenhängende schlüssige Antworten.

MP 14.3 Mo 14:00 SFG 2010

Emission and Regeneration UFT — •Osvaldo Domann — Stephanstr. 42, D- 85077 Manching

The SM defines for each force a different field resulting the electric, magnetic, weak, strong and gravitation fields. Based on a space-like representation of Subatomic Particles (SPs) as Focal Points of rays of Fundamental Particles (FPs) that extend over the whole space, a theory is presented where all known forces are derived from one single field. FPs store the energy of the SPs as rotations defining angular momenta allowing the description of the interactions between SPs as the interactions between the angular momenta of their FPs. The main finding of the approach is that many concepts introduced by the SM like gluons, gravitons, dark mater, dark energy, equivalence principle, etc. are not required. Another important finding is the interaction of light with the measuring instruments which together with the emission of light with speed *c* relative to its source allows the deduction of all relevant relativistic equations without the need of unphysical concepts like time dilation and length contraction. More at www.odomann.com