

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. FRÖB¹ und JAN HOLLAND² — ¹Department of Mathematics, University of York, YO10 5DD, Heslington, York, UK — ²Springer-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.