Aktuelle Veranstaltungen

Kolloquium

Thema: **Why do things thermalize in a box?**

Datum: 26.04.21

Uhrzeit: 16:15

Ort: cyberspace

Vortragender: Masud Haque

Maynooth University, Ireland

Inhalt: The eigenstate thermalization hypothesis (ETH) is a cornerstone in our understanding of quantum statistical mechanics. In the first part of the talk, I will give a broad overview of thermalization of isolated quantum systems, and of the role played by random-matrix descriptions. The extent to which ETH holds for nonlocal operators (observables) is an open question. In the second half of the talk, I will address this question using an analogy with random matrix theory.

Ansprechpartner: J. Schnack/FOR2692

Kolloquium Mathematische Physik

Thema: **Integrability and Universality in nonlinear waves**

Datum: 05.02.21

Uhrzeit: 16:15

Ort: ZOOM/Konferenzschaltung

Vortragender: Tamara Grava

University of Bristol

Inhalt: What is an integrable system? Intuitively, an integrable system is a dynamical system that can be integrated directly. While in principle integrable systems should be very rare, it happens that in nature, a lot of fundamental systems are integrable such as many models of nonlinear waves, models in statistical mechanics and in theory of random matrices. The study of nonlinear waves has led to many remarkable discoveries, one of them being 'solitons', found some 50 years ago. Solitons motivated the development of the Inverse Scattering Transform (IST). History and some examples will be discussed. Finally I will present some universality results about small dispersion limits and semiclassical limits of nonlinear dispersive waves.

Ansprechpartner: G. Akemann

Seminar Hochenergiephysik

Thema: **Is Our Universe the Remnant of Chiral Anomaly in Inflation?**

Datum: 27.04.21

Uhrzeit: 14:15

Ort: Online, via ZOOM

Vortragender: Azadeh Maleknejad

CERN, Geneva

Inhalt: Modern cosmology has been remarkably successful in describing the Universe from a second after the Big Bang until today. However, its physics before that time is still much less certain. It profoundly involves particle theory beyond the Standard Model to explain long-standing puzzles: the origin of the observed matter asymmetry, nature of dark matter, massive neutrinos, and cosmic inflation. In this talk, I will explain that a new framework based on embedding axion-inflation in left-right symmetric gauge extensions of the SM can possibly solve and relate these seemingly unrelated mysteries of modern cosmology. The baryon asymmetry and dark matter today are remnants of a pure quantum effect (chiral anomaly) in inflation which is the source of CP violation in inflation. As a smoking gun, this setup has robust observable signatures for the GW background to be probed by future CMB missions and laser interferometer detectors.

Ansprechpartner: D. Bödeker

Seminar Kondensierte Materie

Thema: **Quantum scars and Hilbert space fragmentation of color and ice**

Datum: 06.05.21

Uhrzeit: 16:00

Ort: ZOOM / Konferenzschaltung

Vortragender: Hitesh J. Changlani

Florida State University and National High Magnetic Field Laboratory

Inhalt:

Non-equilibrium properties of quantum materials present many intriguing properties, among them athermal behavior, which violates the eigenstate thermalization hypothesis. Such behavior has primarily been observed in disordered systems. More recently, experimental, and theoretical evidence for athermal eigenstates, known as ``quantum scars", has emerged in non-integrable disorder-free models in one dimension with constrained dynamics [1]. I will focus on directions that my group is pursuing in the context of geometrically frustrated magnets. First, I show the existence of quantum scar eigenstates and investigate their dynamical properties in many simple two-body Hamiltonians with staggered interactions, involving ferromagnetic and antiferromagnetic motifs, in arbitrary dimensions. These magnetic models include simple modifications of widely studied ones (e.g., the XXZ model) on a variety of lattices [2]. I will demonstrate our ideas by focusing on the two-dimensional frustrated spin 1/2 kagome antiferromagnet, which was previously shown to harbor a special exactly solvable point with "three-coloring" ground states in its phase diagram [3,4,5]. Next, I discuss how Hilbert space fragmentation naturally arises in many frustrated magnets with low energy ``ice manifolds" which gives rise to a broad range of relaxation times for different initial states [6]. We study the Balents-Fisher-Girvin Hamiltonian, and a phenomenological three-coloring model with loop excitations (previously explored in the context of quantum spin liquids), both with constrained Hilbert spaces. We characterize the formation of the fragmented Hilbert space of these Hamiltonians, their level statistics, and initial state dependence of relaxation dynamics to develop a coherent picture of glassiness in various limits of the XXZ model on the kagome lattice. [1] H. Bernien et al., Nature 551, 579–584 (2017); C. Turner et al., Nature Physics 14, 745-749 (2018) [2] K. Lee, R. Melendrez, A. Pal, H.J. Changlani, Phys. Rev. B 101, 241111(R) (2020) [3] H.J. Changlani, D. Kochkov, K. Kumar, B. K. Clark, E. Fradkin, Phys. Rev. Lett. 120, 117202 (2018) [4] H.J. Changlani, S. Pujari, C-M. Chung, B K. Clark, Phys. Rev. B 99, 104433 (2019) [5] S. Pal, P. Sharma, H. J. Changlani, and S. Pujari, Phys. Rev. B 103, 144414 (2021) [6] K. Lee, A. Pal, H.J. Changlani, arXiv:2011.01936 (2020)

Ansprechpartner: Jürgen Schnack

Seminar Mathematische Physik

Thema: **The Character Expansion in effective Theories for chiral Symmetry Breaking**

Datum: 03.12.20

Uhrzeit: 16:30

Ort: ZOOM / Konferenzschaltung

Vortragender: Noah Aygün

Universität Bielefeld

Inhalt:

Ansprechpartner: Gernot Akemann

Seminar Bielefeld-Melbourne Zufallsmatrizen

Thema: **20210428 - Jesper Ipsen - TBC**

Datum: 28.04.21

Uhrzeit: 09:00

Ort: ZOOM / Konferenzschaltung

Vortragender: Jesper Ipsen

University of Melbourne

Inhalt:

Ansprechpartner: Anas Rahman