

# Aktuelle Veranstaltungen

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## Kolloquium

**Thema:** Arbeitsgruppenvorstellung

**Datum:** 06.12.22

**Uhrzeit:** 14:15

**Ort:** H6

**Vortragender:** Dozenten der Physik

**Inhalt:**

**Ansprechpartner:** [Fachschaft](#)

## Kolloquium Mathematische Physik

**Thema:** tba

**Datum:** 13.01.23

**Uhrzeit:** 16:15

**Ort:** D5-153

**Vortragender:** [Felix Finster](#)

Universität Regensburg

**Inhalt:**

**Ansprechpartner:** [G. Akemann](#)

## Seminar Hochenergiephysik

**Thema:** [Relativistic dynamics in black hole systems and efforts toward the discovery of nano-Hz GWs](#)

**Datum:** 12.12.22

**Uhrzeit:** 16:15

**Ort:** D6-135

**Vortragender:** [Prerna Rana](#)

TIFR Mumbai

**Inhalt:** The study of bound particle trajectories around a rotating black hole is crucial to understanding many astrophysical phenomena. I will present a new closed-form analytic solution for the generalized non-equatorial eccentric bound particle trajectories, and their fundamental frequencies, in the Kerr spacetime using general relativity. The trajectories are expressed in the eccentricity, inverse-latus rectum, spin, and Carter's constant ( $e, \ell, a, Q$ ) parameter space. The generalized solutions also enabled us to obtain the necessary bound orbit conditions for  $(e, \ell, a, Q)$  and novel specialized formulae for equatorial, spherical, and non-equatorial separatrix orbits. Next, I will present the Generalized Relativistic Precession Model (GRPM), which utilizes the analytic solutions of trajectories in the Kerr spacetime, to explain the origin of Quasi-periodic oscillations (QPOs) in black hole X-ray binaries (BHXRBS). Our analysis of the plasma fluid flow around a Kerr black hole in the relativistic disk edge suggests that instabilities cause QPOs to originate in a torus region spanned by geodesics. The application of the GRPM will also be shown for X-ray QPOs seen in Seyfert galaxies. Toward the end, I will discuss our recent efforts for the first official data release of the Indian Pulsar Timing Array (InPTA), which will be incorporated into the global effort of the International Pulsar Timing Array (IPTA) consortium to discover nano-Hz gravitational waves emitted by the relativistic supermassive black hole binaries.

**Ansprechpartner:** [D. Schwarz](#)

## Seminar Kondensierte Materie

## Ein Vergleich von kleinen klassischen und quantenmechanischen Spinsystemen

**Thema:**

**Datum:** 01.12.22

**Uhrzeit:** 14:15

**Ort:** D5-153

**Vortragender:** Jonas Steffan

Universität Bielefeld

**Inhalt:**

**Ansprechpartner:** [Jürgen Schnack](#)

## Seminar Mathematische Physik

**Thema:** [String-localized quantum fields and some phenomenological applications](#)

**Datum:** 01.12.22

**Uhrzeit:** 16:00

**Ort:** D5-153

**Vortragender:** [José Gracia Bondia](#)

University of Zaragoza, Spain

**Inhalt:** Over fifteen years ago, on the basis of modular theory, string-localized quantum fields (SLQF) were developed by Mund, Rehren, Schroer and Yngvason. There were precedents for them, particularly in work by Buchholz and Fredenhagen towards the end of last century. On the theoretical side, SLQF allow to deal with Wigner particles not covered by Wightman's axioms. They provide as well for new viewpoints and techniques in the phenomenology of the Standard Model.

Ansprechpartner: [Gernot Akemann](#)

## Seminar Bielefeld-Melbourne Zufallsmatrizen

**Thema:** [Moments and SU\(N\) algebra for Embedded Unitary Ensemble](#)

**Datum:** 07.12.22

**Uhrzeit:** 09:00

**Ort:** ZOOM / Konferenzschaltung

**Vortragender:** [V.K.B. Kota](#)

Physical Research Laboratory Ahmedabad

**Inhalt:**

Embedded random matrix ensembles with  $k$ -body interactions, usually called  $EE(k)$ , introduced 50 years back in the context of nuclear shell model, are now well established to be appropriate for understanding statistical properties of many quantum systems [1]. Say  $m$  fermions (or bosons) are in  $N$  degenerate single particle states and interacting with  $k$ -body interactions. Then, with direct product representation of the many-particle states, the  $k$  and  $m$  fermion space dimensions are  $\binom{N}{k}$  and  $\binom{N}{m}$  respectively. Now, with a GUE representation for the Hamiltonian ( $H$ ) matrix in the  $k$  particle space, the  $m$ -particle  $H$  matrix will be  $EGUE(k)$  - embedded GUE with  $k$ -body interactions. Similarly, we have  $EGOE(k)$  and  $EGSE(k)$ . Note that for  $k=m$  we have the classical GOE, GUE and GSE. Recently, using the formulas for the moments up to order 8, it is established that the one-point function, ensemble averaged density of eigenvalues, follows the so called  $q$ -normal distribution for  $EGUE(k)$  [also for  $EGOE(k)$ ] with  $q$  defined by the fourth moment [2]. The  $q$ -normal generates Gaussian density for  $k \ll m$  and semi-circle for  $k=m$ . Unlike the one-point function, till today there is no success in deriving the two-point correlation function for  $EGUE(k)$  or  $EGOE(k)$  even in the limit of  $k <$

Ansprechpartner: [Mario Kieburg](#)