density of these defects lead to a characteristic exponential momentum distribution as well as stability of the condensate towards exterior pertubations. Experimental and numerical results are compared to analytical predictions drawn from our model of randomly distributed defects. Complete thermalization of the system is observed through measurements of the momentum distribution, exhibiting a transition from the random defect to a modifed Yang-Yang model.

Q 15.36 Mon 17:00 C/Foyer

Universal dynamics and non-thermal fixed points in spinor Bose-Einstein condensates — •Anselm Klenner[1,2,3], Markus Karl[1,2,3], and Thomas Gasenzer[1,2,3] — [1]Kirchhoff-Institut für Physik, Ruprecht-Karls-Universität Heidelberg, Im Neuenheimer Feld 227, 69120 Heidelberg, Germany — [2]Institut für Theoretische Physik, Ruprecht-Karls-Universität Heidelberg, Philosophenweg 16, 69120 Heidelberg, Germany — [3]ExtreMe Matter Institute EMMI, GSI Helmholtzzentrum für Schwerionenforschung GmbH, Planckstraße 1, 64291 Darmstadt, Germany

Using numerical simulations we investigate second order phase transitions of spin-1 spinor Bose-Einstein condensates. For the simulations we use the truncated Wigner method which is a statistical approach and uses classical field equations. The spinor condensates provide us with a rich variety of phases and topological defects such as domain walls, spin textures and spin vortices. The types of defects which are created depend on the properties of the critical point. In these simulations we can reach states with quasi-stationary, non-equilibrium momentum distributions, which indicate the vicinity of a non-thermal fixed point. Spinor Bose gases provide ideal means to study such universal critical dynamics far from equilibrium, which is expected to be relevant for a wide range of phenomena far beyond ultracold gases.

Q 15.37 Mon 17:00 C/Foyer

Dynamical universal properties of one-dimensional split condensates — •Sebastian Erne[1,2,4], Valentin Kasper[1], Jürgen Berges[1], Thomas Gasenzer[1,2,3], and Jörg Schmiedmayer[4] — [1]Institut für Theoretische Physik, Ruprecht-Karls-Universität Heidelberg, Philosophenweg 16, 69120 Heidelberg, Germany — [2]ExtreMe Matter Institute EMMI, GSI Helmholtzzentrum für Schwerionenforschung GmbH, Planckstraße 1, 64291 Darmstadt, Germany — [3]Kirchhoff-Institut für Physik, INF 227, 69120 Heidelberg, Germany — [4]Vienna Center for Quantum Science and Technology (VCQ), Atominstitut, TU Wien, Vienna, Austria

The recent measurement of higher-order phase correlation functions enables a precise examination of non-Gaussian correlations in the relative phase of two one-dimensional quasicondensates. This shows the necessity of refined non-pertubative theoretical descriptions of split condensates. For these systems the early time evolution of squeezed states is well described by a quadratic theory. In this work we investigate how the linear coupling between two one-dimensional Bose gases controls the non-Gaussian contributions. The subsequent quench of this control parameter can proceed in two directions: Increasing or decreasing the non-gaussianity of the systems as compared to the initial state. Finally we report on universal properties of the dynamics of higher-order correlation functions.

Q 15.38 Mon 17:00 C/Foyer

Nonthermal fixed points and superfluid turbulence in 2D ultracold Bose gases — •Fabian Brock[1,2], Simon Sailer[1,2], Markus Karls[1,2], and Thomas Gasenzer[1,2] — [1]Kirchhoff-Institut für Physik, Im Neuenheimer Feld 227, 69120 Heidelberg — [2]Institut für Theoretische Physik, Ruprecht-Karls-Universität Heidelberg, Philosophenweg 16, 69120 Heidelberg

The behavior of turbulent one-component Bose-Einstein condensates is studied by simulations of the driven-dissipative Gross-Pitaevskii equation and free expansion dynamics. The aspect ratio during free expansion is studied using the GPE and a hydrodynamic model based on Eulers equations. By comparison to non-turbulent systems, this gives insight into the influence of vorticity on the expansion dynamics. The results aim to help the study of superfluid turbulence in experiment by measuring the gas after some given expansion time and drawing inferences on its initial state. In the driven-dissipative case, non-thermal fixed points far away from equilibrium are studied. Power laws in the occupation number are numerically determined by vortex statistics and compared to analytical results.

Q 15.39 Mon 17:00 C/Foyer

Towards a degenerate quasi 2D gas of fermions near the BEC-BCS crossover — •Thomas Paintner, Daniel Hoffmann, Stefan Häusler, Wladimir Schoch, Wolfgang Limmer, Benjamin Deissler, and Johannes Hecker-Denschlag — Universität Ulm, Institut für Quantenmaterie, Deutschland

Here, we present the creation of a two-dimensional gas of ultracold fermions near the BEC-BCS crossover.

We prepared a sample of ultracold ^{6}Li atoms in the lowest two hyperfine states in a strong single beam optical dipole trap. For implementing a quasi 2D degenerate gas we focus a blue detuned TEM_{01} beam on our atoms [1].

To create the TEM_{01}, we illuminate a π-phase plate with a high power laser at 532nm. In the far field a TEM_{01} profile is created. We can change the size of the TEM_{01} mode by changing the laser beam waist. Strong enough confinement of the atoms in the TEM_{01} laser field will freeze out the atomic motion in this direction, leading to a quasi 2D gas.

Reducing the dimension of the system is another major step towards the realization of an all optical 2D honeycomb lattice.

[1] Opt.Express 13, 2843-2851 (2005)

Q 15.40 Mon 17:00 C/Foyer

Time-of-Flight Expansion for Trapped Dipolar Fermi Gases: From Collisionless to Hydrodynamic Regime — •Vladimir Veljić[1], Antun Balaž[1], and Axel Pelster[2] — [1]Scientific Computing Laboratory, Institute of Physics Belgrade, University of Belgrade, Serbia — [2]Physics Department and Research Center OPTIMAS, Technical University of Kaiserslautern, Germany

Some time ago it was predicted that the momentum distribution of a Fermi gas is deformed from spherical to cyclindrical provided a dipole-dipole interaction is present. A recent time-of-flight (TOF) expansion experiment has now unambiguously detected such a Fermi surface deformation in a dipolar quantum gas of fermionic erbium atoms in the collisionless regime [1]. Here we follow Ref. [2] and perform a systematic study of TOF expansions for trapped dipolar Fermi gases ranging from the collisionless to the hydrodynamic regime at zero temperature. To this end we solve analytically the underlying Boltzmann-Vlasov equation in the vicinity of equilibrium by using a suitable rescaling of the equilibrium distribution, where the collision integral is simplified within a relaxation-time approximation. The resulting ordinary differential equations for the scaling parameters are then solved numerically for experimentally realistic parameters for increasing relaxation times. Our analysis is, thus, useful for future TOF experiments in order to determine the value of the underlying relaxation time from expansion data.

[1] K. Aikawa et al., Science **345**, 1484 (2014)

[2] F. Wächtler, A. R. P. Lima, and A. Pelster, `arXiv:1311.5100`

Q 15.41 Mon 17:00 C/Foyer

Bogoliubov Theory of Dipolar Bose Gas in Weak Random Potential — •Mahmoud Ghabour[1] and Axel Pelster[2] — [1]Physics Department, Freie Universität Berlin, Germany — [2]Physics Department and Research Center OPTIMAS, Technische Universität Kaiserslautern, Germany

We consider a dilute homogeneous Bose gas with both an isotropic short-range contact interaction and an anisotropic long-range dipole-dipole interaction in a weak random potential at low temperature in three dimensions. Within the realm of Bogoliubov theory we analyze how both condensate and superfluid density are depleted due to quantum and thermal fluctuations as well as disorder fluctuations. Afterwards, we calculate with this the resulting velocities of first and second sound within an anisotropic extension of the Landau-Khalatinikov two-fluid model.

[1] K. Huang and H. F. Meng, Phys. Rev. Lett. **69**, 644 (1992)

[2] C. Krumnow and A. Pelster, Phys. Rev. A **84**, 021608(R) (2011)

[3] B. Nikolic, A. Balaz, and A. Pelster, Phys. Rev. A **88**, 013624 (2013)

[4] M. Ghabour and A. Pelster, `arXiv:1410.3070`

Q 15.42 Mon 17:00 C/Foyer

Analytical and Numerical Study of Bose-Einstein Condensate with Localized Impurity — •Javed Akram[1] and Axel Pelster[2] — [1]Physics Department, Freie Universität Berlin Germany — [2]Physics Department and Research Center OPTIMAS, Technische Universität Kaiserslautern Germany

Motivated by the recent experimental work of Refs. [1, 2], we investigate a localized ^{133}Cs impurity in the center of a trapped ^{87}Rb