GR 17: Cosmology II

Time: Friday 9:00–10:00 Location: KH 01.016

Invited Talk GR 17.1 Fri 9:00 KH 01.016

Radio Cosmology and the Cosmic Dawn — •Jonathan Pritchard — Max Planck Institute for Radio Astronomy

In this talk, I will review the status of experiments attempting to detect the 21cm signal from reionization and the time of the first galaxies, In particular, I will discuss 21cm global experiments, especially REACH - a global 21 cm experiment deployed in the the Karou in South Africa. I will also discuss some of the preparation work for epoch of reionization studies with the Square Kilometre Array and describe applications of machine learning algorithms for inferring science from 21cm observations.

GR 17.2 Fri 9:30 KH 01.016

Early growth of structure with warm wave dark matter — •Simon May — Universität Bielefeld, Universitätsstraße 25, 33615 Bielefeld, Germany

I will present unique features in the growth of structure in wave dark matter models with warm white noise, where the power spectrum is peaked at sub-horizon wavenumbers. The post-inflationary production of bosonic particles, such as axions or axion-like particles, leads to an enhanced isocurvature density power spectrum on small scales. Moreover, when dark matter is extremely light, these inhomogeneities result in a non-negligible velocity dispersion and hence free-streaming suppression of the adiabatic power spectrum. Starting with the Schrödinger–Poisson system of equations as the relevant equations of motion, I will present results from analytic calculations and numerical simulations of cosmic structure formation. The results show the enhancement and evolution of the small-scale power spectrum and the formation of non-linear collapsed objects, including wave dark matter halos and Bose stars (solitons), shortly after matter–radiation equality. Using hydrodynamical simulations of warm wave dark matter with baryons, I will further show how this affects the early clustering of baryonic matter. Probes of the small-scale power spectrum (e.g. dynamical heating of stars, Ly-α forest, gravitational lensing, 21cm-line intensity mapping) can be sensitive to these effects on quasi-linear scales, making this broad class of dark matter models accessible to observations.

GR 17.3 Fri 9:45 KH 01.016

Comparing Gravitational Wave Spectra of Inflation Models — •Alexander Schneider[1], Tom Krokotsch[1], Gudrid Moortgat-Pick[1,2], and Andreas Ringwald[2] — [1]University of Hamburg, Hamburg, Germany — [2]Desy, Hamburg Germany

Inflation is currently among the most favored explanations for the horizon and the flatness problem, and there are several plausible models.

Many of them are predicted to have produced a gravitational wave background, the measurement of which could be a direct way of probing inflation.

In this talk, we present simulations of two inflation models and subsequent reheating processes with a focus on their respective gravitational wave spectra. Among the questions discussed are the prospects to measure the primordial gravitational wave backgrounds from these processes today, and how such a measurement could be used to differentiate between models.