FAKULTÄT für PHYSIK
LUDWIG-MAXIMILIANS-UNIVERSITÄT
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PHYSIK-DEPARTMENT
TECHNISCHE UNIVERSITÄT MÜNCHEN
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Garchinger Maier-Leibnitz-Kolloquium

Donnerstag, 10.06.2021, 16^{15} Uhr

Online via ZOOM:

https://lmu-munich.zoom.us/j/98457332925?pwd=TWc3V1JkSHpyOTBPQVlMelhuNnZ1dz09

Meeting ID: 984 5733 2925
Passcode: 979953

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Modern Neutrino Cosmology

Neutrinos are a key (although implicit) ingredient of the standard cosmological model, ΛCDM. Firstly, neutrinos directly participate in Big Bang Nucleonsynthesis, and secondly, they represent 40% of the energy density of the Universe after electron-positron annihilation up to almost matter radiation equality. The latter fact makes neutrinos a necessary element to understand the very precise observations of the Cosmic Microwave Background.
In this Colloquium, I will review the cosmological implications of neutrinos. I will explain how current cosmological observations can be used to constrain their masses, their abundances, and their properties – such as their interaction rate with other species. In particular, I will discuss various cosmological settings where the typically very stringent constraint on their masses can be substantially relaxed. I will then show how the measurements of the effective number of neutrino species in the early Universe can place stringent bounds on many extensions of the Standard Model of particle physics. I will finish by reviewing the role neutrinos can play with regard to the outstanding Hubble tension. In particular, I will show that pseudo-Goldstone bosons (majorons), interacting with neutrinos right before recombination, represent a well motivated possibility to ameliorate the Hubble tension.

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