

Theorie-Palaver

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Lorentz room (Staudingerweg 7, 5th floor)

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Sterile neutrino dark matter in non-standard scenarios

In our current understanding of the universe, the fundamental nature of one of its most abundant constituents, the dark matter (DM), is still a mystery. Among the many theorized candidates to play the role of DM, in this talk I will focus on sterile neutrinos with mass of $O(\text{keV})$ and in particular on their production in the early universe and phenomenology in terrestrial experiments today. The simplest mechanism able to produce sterile neutrino DM in the early universe is named Dodelson-Widrow mechanism after its inventors. Although very fascinating due to its extreme simplicity, if we assume that sterile neutrinos constitute the entire abundance of DM today this vanilla solution is, on the one hand, far from the region of the parameter space in which near future experiments will be sensitive to such particles and, on the other hand, mostly excluded by X-ray observations. After introducing the standard/vanilla scenario, I will discuss three minimal modifications to the standard scenario that change drastically the perspectives of detection of this DM candidate in the near future. They have to do with the following questions. What if before Big Bang Nucleosynthesis the universe evolved differently with respect to what is usually assumed? Should we consider the X-ray bound to be absolute or model dependent? What if active neutrinos interact among each other also with non-standard interactions?