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JOHANNES GUTENBERG UNIVERSITÄT MAINZ

THEP Journal Club

April 26, 2018 at 2 p.m.
Minkowski Raum, Staudinger Weg 7, 05-119

Pizza & Physics at Lunchtime

Note: Masters defense, Medienraum, 03-431

Sven Baumholzer
JGU Mainz

Leptogenesis and light DM in the Scotogenic model

The standard model of particle physics (SM) fails to explain several phenomena occurring in high energy physics and cosmology which we want to address in this thesis.
We do so by studying the so called “scotogenic model”, where we add an second Higgs doublet and three gauge-singlet neutrinos to the existing SM particle content. Furthermore, all new particles are supposed to be charged under a new parity symmetry. Due to this symmetry, SM neutrino masses are generated at one-loop level.
By considering particle masses below the TeV-scale such that the new scalars are heavier than the singlet neutrinos, will qualify the lightest particle for a viable dark matter candidate. The baryon asymmetry is generated via a dynamical production of asymmetries in the lepton sector through a mechanism called leptogenesis.
We study the production of dark matter via two different mechanisms and find that the correct relic density can be obtained for a wide range of parameters. In addition, we show that there is a region in the parameter space which leads to a sizable generation of baryon asymmetries. Finally, we discuss the viability of simultaneous explanation of both dark matter and

baryon asymmetry.
All our findings are critically compared to the constraints coming primarily from measurements of the primordial abundances of light nuclei, stability of the Higgs potential and lepton flavor violation processes.

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