

INTISARI

KOPLING TERMAL DI SEKTOR SKALAR MODEL CERMIN DENGAN MEKANISME SEESAW TIPE-II

Oleh

Yehezkiel Adhi Satria
19/445599/PA/19423

Telah disusun analisis kopling termal pada model cermin yang dilengkapi Mekanisme Seesaw tipe II. Penelitian sektor skalar model cermin ini memberikan kopling termal antara sektor model standar dan sektor cermin melalui partikel skalar Higgs sebagai fungsi suhu. Uji coba yang dilakukan dengan nilai α_H pada orde $\mathcal{O}(10^{-9})$, untuk perbandingan laju reaksi (Γ) dengan laju ekspansi alam semesta (H), menghasilkan kopling sektor cermin dan sektor model standar memiliki batas kopling-*decoupling*. Pada suhu di atas suhu transisi nilai ekspektasi vakum partikel h_R , yaitu $T = 1398.4\text{GeV}$, sektor model standar dan sektor cermin belum mengalami kopling. Di bawah suhu tersebut ($T < 1398.4\text{GeV}$), partikel h_R memiliki nilai ekspektasi vakum dan kedua sektor mengalami kopling hingga di sebaran suhu $150 - 200\text{GeV}$, sektor model standar dan sektor cermin mengalami *thermal decoupling*.

Kata kunci: Ekspansi alam semesta, kendala kosmologi, kopling termal, mekanisme seesaw, model cermin, sektor skalar.

ABSTRACT

THERMAL COUPLING IN THE SCALAR SECTOR OF MIRROR MODEL WITH TYPE-II SEESAW MECHANISM

By

Yehezkiel Adhi Satria
19/445599/PA/19423

An analysis of thermal coupling has been conducted on the mirror model equipped with the Type II Seesaw Mechanism. This study of the scalar sector of the mirror model provides the thermal coupling between the standard model sector and the mirror sector through the scalar Higgs particle as a function of temperature. Trial tests with a value of α_H at the order of $\mathcal{O}(10^{-9})$, comparing the reaction rate (Γ) with the expansion rate of the universe (H), demonstrate that the coupling between the mirror sector and the standard model sector exhibits a coupling-decoupling limit. At temperatures above the vacuum expectation value transition temperature of the particle h_R , at $T = 1398.4$, the standard model sector and the mirror sector are not yet coupled. Below that temperature ($T < 1398.4$ GeV), the particle h_R has a vacuum expectation value, and both sectors are coupled until the temperature range of $150 - 200$ GeV, after which the two sectors begin to thermally decouple.

Keywords: Cosmological constraint, expansion of the universe, mirror model, scalar sector, seesaw mechanism, thermal coupling.