

# README – Annihilation Bias Leptogenesis

This repository explores a toy model for generating a matter-antimatter asymmetry through biased scalar-driven annihilation. Using a simple ODE system, it demonstrates how a small scalar bias ( $\epsilon$ ) applied during particle annihilation and re-creation can lead to a net baryon or lepton excess, offering a dynamic alternative to classical baryogenesis assumptions. The simulation tracks the evolution of: - Pair density (P) - Matter excess (A) - Residual energy reservoir (R) Key features: - Energy conservation is monitored via an expansion term (H) - Parameter scan included for bias  $\epsilon$  - CSV and PDF outputs - Lightweight, educational, and reproducible Includes: - Python code for dynamic scalar annihilation simulation - PDF write-up of theory and equations - Sample output data This repo is ideal for theorists, students, and cosmology nerds interested in symmetry breaking, early universe models, or just really bad jokes about annihilation. Author: Robert Hogan-Schrader Contact: robbiedeluge@gmail.com License: MIT