==
README: Data, Figures, and Code for "The Resonant Dark Universe"
==

PROJECT TITLE: The Resonant Dark Universe: A Unified Framework for Cosmology and the Standard Model
AUTHOR: Joshua Knoechelman
DATE: August 2025
CONTACT: [Enter Your Email Address Here]

==
DESCRIPTION
==

This repository contains the preprint, all supporting figures, and simulation code for the paper, "The Resonant Dark Universe: A Unified Framework for Cosmology and the Standard Model."

Abstract: Standard cosmological and particle physics models face foundational challenges regarding the nature of time, dark energy, dark matter, and their lack of unification. We present the Resonant Dark Universe (RDU), a complete cosmological and particle physics framework that resolves these issues from first principles. The RDU is predicated on a "no-time" philosophy in which reality is a discrete sequence of quantum states governed by a single scalar entity, the Chronos Field. [...] By reducing the universe's free parameters from 19 to 8 and providing a complete, self-consistent, and falsifiable framework, the RDU stands as a candidate for a final Theory of Everything.

==
FILE MANIFEST
==

-- Main Publication --

* Knoechelman_2025_Resonant_Dark_Universe.pdf
    The full preprint of the paper.

-- Foundational & Conceptual Figures --

* Figure_01_Genesis_Simulation.png

"The Genesis Simulation: Emergence of Particles from the Primordial Chronos Field".

* Figure_02_Egress_Factor_vs_DRC_Class.png
"RDU Data Analysis: Egress Factor vs. DRC Class".

* Figure_03_Gravitational_Wave_from_Binary_DRCs.png
"RDU Simulation: Gravitational Wave from Binary DRCs".

-- Cosmological Validation Figures --

* Figure_04_Simulated_CMB_Slice.png
"RDU Simulated CMB - High-Resolution 2D Slice".

* Figure_05_CMB_Power_Spectrum.png
"RDU Final Prediction vs. Standard Cosmological Model".

* Figure_06_Dark_Energy_Constraints.png
"Cosmological Constraints on Dark Energy Parameters".

-- N-Body & Galactic Simulation Figures --

* Figure_07_Proto_Galaxy_Particle_Tracks.png
"RDU Proto-Galaxy (Steps 0 to 320000)".

* Figure_08_Proto_Galaxy_Early_State.png
"RDU Proto-Galaxy (Steps 0 to 51000)".

* Figure_09_Galaxy_State_Dashboard.png
"Galaxy State at Step 49900" (Dashboard View).

* Figure_10_Dark_Matter_Halo_Profiles.png
"Comparative Radial Density Profiles of Dark Matter Halos".

-- Particle Derivations: Leptons --

* Figure_11_Electron_Soliton.png
"RDU Simulation: Stable Electron Soliton".

* Figure_12_Electron_Energy_Convergence.png
"RDU Simulation: Energy Convergence to Electron Mass" (0.511 MeV).

* Figure_13_Muon_Soliton.png
"RDU Simulation: Stable Muon Soliton".

* Figure_14_Muon_Energy_Convergence.png
  "RDU Simulation: Energy Convergence to Muon Mass" (105.8 MeV).

* Figure_15_Tau_Soliton.png
  "RDU Simulation: Stable Tau Soliton".

* Figure_16_Tau_Energy_Convergence.png
  "RDU Simulation: Energy Convergence to Tau Mass" (1779.0 MeV).

-- Particle Derivations: Neutrinos --

* Figure_17_Electron_Neutrino_Soliton.png
  "RDU Simulation: Stable Electron Neutrino Soliton".

* Figure_18_Electron_Neutrino_Energy_Convergence.png
  "RDU Simulation: Energy Convergence to Electron Neutrino Mass" (5.0e-08 MeV).

* Figure_19_Muon_Neutrino_Soliton.png
  "RDU Simulation: Stable Muon Neutrino Soliton".

* Figure_20_Muon_Neutrino_Energy_Convergence.png
  "RDU Simulation: Energy Convergence to Muon Neutrino Mass" (9.0e-08 MeV).

* Figure_21_Tau_Neutrino_Soliton.png
  "RDU Simulation: Stable Tau Neutrino Soliton".

* Figure_22_Tau_Neutrino_Energy_Convergence.png
  "RDU Simulation: Energy Convergence to Tau Neutrino Mass" (1.2e-07 MeV).

-- Particle Derivations: Gauge Bosons --

* Figure_23_Photon_Generation.png
  "RDU Simulation: Photon Generation from Electron".

* Figure_24_W_Boson_Generation.png
  "RDU Simulation: W Boson Generation via Quark Transformation".

* Figure_25_Z_Boson_Fluctuation.png
  "RDU Simulation: Z Boson Fluctuation".

* Figure_26_Gluon_Field_Confinement.png
  "RDU Analysis: The Gluon Field as the Confinement Potential".

-- Particle Derivations: Quarks & Hadrons --

* Figure_27_Quark_Mass_Spectrum.png
  "RDU Simulation: Derived Quark Mass Spectrum (Generations 1 & 2)".

* Figure_28_Quark_Antiquark_Energy_Convergence.png
  "RDU Simulation: Quark-Antiquark System Energy Convergence".

* Figure_29_Strange_Quark_Soliton.png
  "RDU Simulation: Stable Strange Quark Soliton".

* Figure_30_Strange_Quark_Energy_Convergence.png
  "RDU Simulation: Energy Convergence to Strange Quark Mass" (96.1 MeV).

* Figure_31_Charm_Quark_Soliton.png
  "RDU Simulation: Stable Charm Quark Soliton".

* Figure_32_Charm_Quark_Energy_Convergence.png
  "RDU Simulation: Energy Convergence to Charm Quark Mass" (1278 MeV).

* Figure_33_Bottom_Quark_Soliton.png
  "RDU Simulation: Stable Bottom Quark Soliton".

* Figure_34_Bottom_Quark_Energy_Convergence.png
  "RDU Simulation: Energy Convergence to Bottom Quark Mass" (4.18 GeV).

* Figure_35_Top_Quark_Soliton.png
  "RDU Simulation: Stable Top Quark Soliton".

* Figure_36_Top_Quark_Energy_Convergence.png
  "RDU Simulation: Energy Convergence to Top Quark Mass" (173.15 GeV).

* Figure_37_Meson_Bound_State.png
  "RDU Simulation: Stable Up-Down Bound State (Meson)".

* Figure_38_Proton_Bound_State.png
  "RDU Simulation: Stable Proton Bound State (Baryon)".

* Figure_39_Proton_Energy_Convergence.png
  "RDU Simulation: Energy Convergence to Proton Mass" (938.5 MeV).

* Figure_40_Neutron_Bound_State.png
  "RDU Simulation: Stable Neutron Bound State (Baryon)".

* Figure_41_Neutron_Energy_Convergence.png

"RDU Simulation: Energy Convergence to Neutron Mass" (939.8 MeV).

-- Source Code --

* Helios_v18_Simulation_Code.pdf
  Python script ("Helios v18") for the Dark Sector Physics Simulation.

==========
USAGE NOTES
==========

* The main paper is in PDF format and requires a standard PDF reader.
* All figures are provided as high-resolution PNG/JPG files.
* The simulation code is in Python (.py) and requires a Python environment with the `numpy` and `cupy` packages installed. The code is optimized for use with a CUDA-enabled GPU.

==========
HOW TO CITE
==========

If you use this work, please cite the main paper. To cite this dataset and its contents specifically, please use the following information:

Knoechelman, Joshua. (2025). Data, Figures, and Code for "The Resonant Dark Universe: A Unified Framework for Cosmology and the Standard Model". Zenodo. [DOI will be assigned here upon publication]