Old Science Fair Project - Black Hole Research

This repository contains a collection of old Python scripts developed as part of a high school science fair project focused on the physics of black holes. The project explored concepts such as Hawking radiation, particle creation, mutual information, black hole evaporation, and radiation spectra.

Each script models a different physical aspect using simplified physical equations and numerical simulations. These programs were designed to support visual data interpretation using plots generated via matplotlib and numerical computations using NumPy.

Note: These files are being uploaded retroactively for archival purposes.

Linked below is the original research paper that accompanied these codes.

Included Python Scripts and Descriptions

Algo1.py: Calculates the stress-energy tensor around a Schwarzschild black hole and its radiation spectrum.

Algo2.py: Models pair creation near the black hole event horizon and calculates the particle creation rate.

Algo3.py: Simulates the blackbody radiation spectrum of a black hole including Hawking temperature calculation.

Algo4.py: Estimates mutual information between ingoing and outgoing wave functions around a black hole.

Algo5.py: Calculates the evaporation rate of a black hole and estimates its total lifetime via Hawking radiation.

Please refer to the attached or linked research paper for full explanations, methodology, and results of this science fair project.