

PHYSICS 20323: Scientific Analysis & Modeling - Fall 2025
Project: Ruby Brake

PROJECT INFORMATION:

Modeling the radioactive decay of 25,000 Radon-222 atoms into Polonium-218, Lead-214, Bismuth-214, Thallium-207, and Lead-207.

The number of seconds is set to 500,000. Here's the graph :

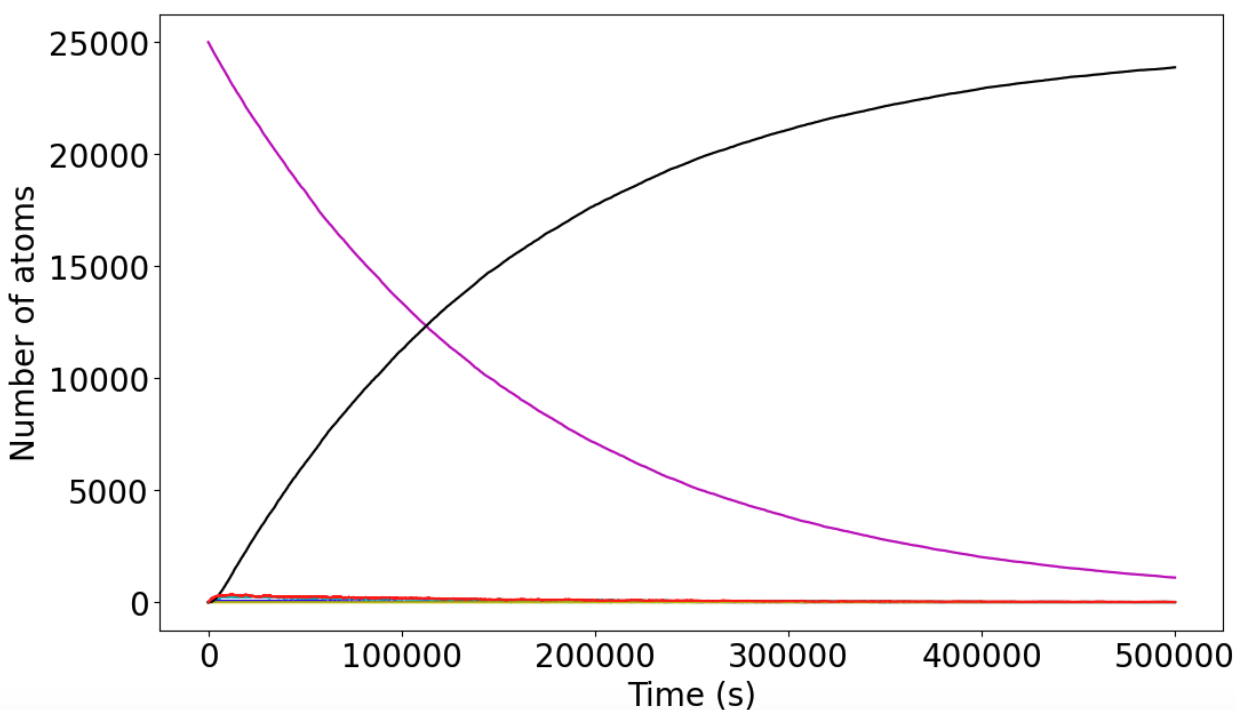


Figure 1: Enter Caption

Pink = Radon
Dark blue = Polonium
Light blue = Bismuth
Yellow = Thallium
Black = Lead-207
Red = Lead-214

The energy generated in each of the decay processes is obviously slightly different every time you run the code.

	alpha	beta	zeta	r	total
average (MeV)	111,795	1,477	216,410	329,476	659,158
standard deviation	1,107.8	47	1,347.4	263.2	677.6

The Shield:

We need to block up to 3 standard deviations of energy. For alpha, that is 115118.4 MeV, so we need 23.02 cm of wood which will cost us 5.76 dollars.

For beta, we are blocking 1,618 MeV, so we need 0.18 cm of water which will cost us 0.45 dollars.

For zeta, we are blocking 220452.2 MeV, so we need 110.23 cm of lead which will cost us 1,322.71 dollars.

For R, we are blocking 330,199.6 MeV, so we need 330.2 cm of gold which will cost us 28,067.0 dollars.

In total, the shield will cost 29,395.89 dollars.