

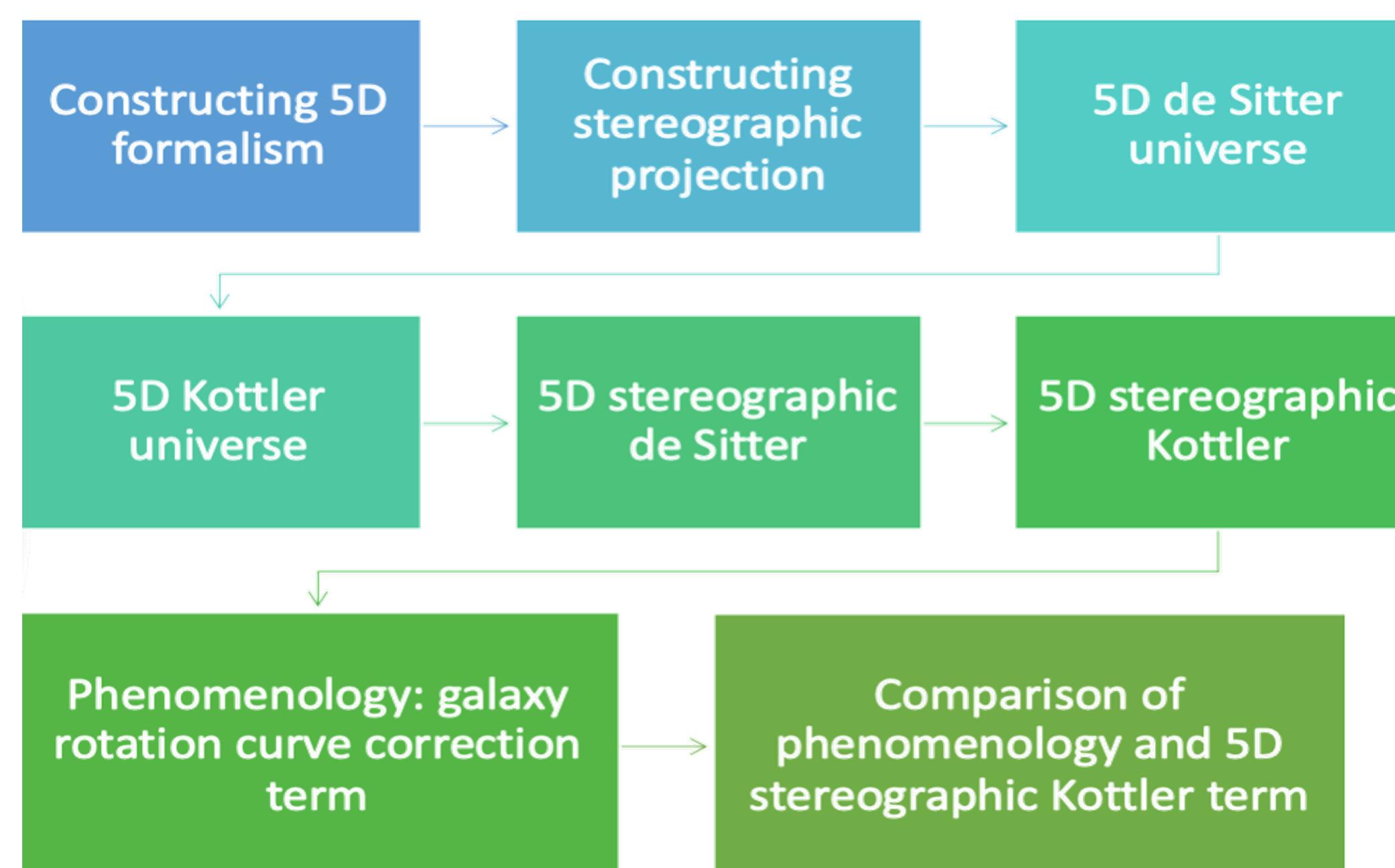
Dark Energy and Dark Matter as Five-Dimensional Stereographic Projection

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Introduction

The simplest explanation of the observed galaxy rotation curves is dark matter, which interacts with ordinary matter only gravitationally (Rich, 2001). Dark energy describes the force that is driving the universe's accelerating expansion. A flat spacetime could be mathematically viewed as an abstract, four-dimensional plane in a five-dimensional pseudo-Euclidean space (Lord, 1976). The results may contribute to the unifying theory of dark matter and dark energy.

Methods

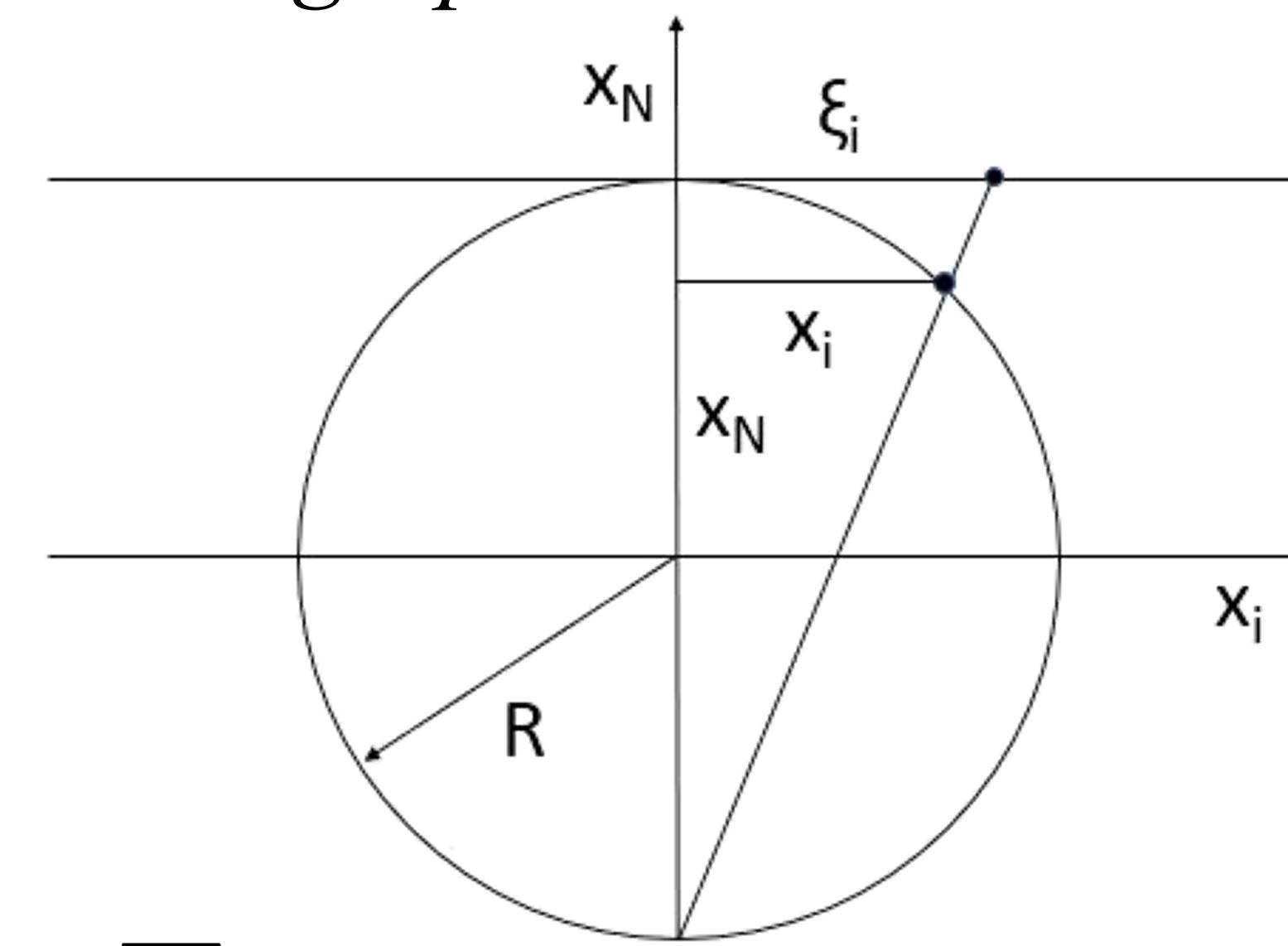


References:

- Lord, E. A., "Tensors, Relativity and Cosmology" (McGraw-Hill 1976).
 Rich, J., "Fundamentals of Cosmology" (Springer, 2001).

Results:

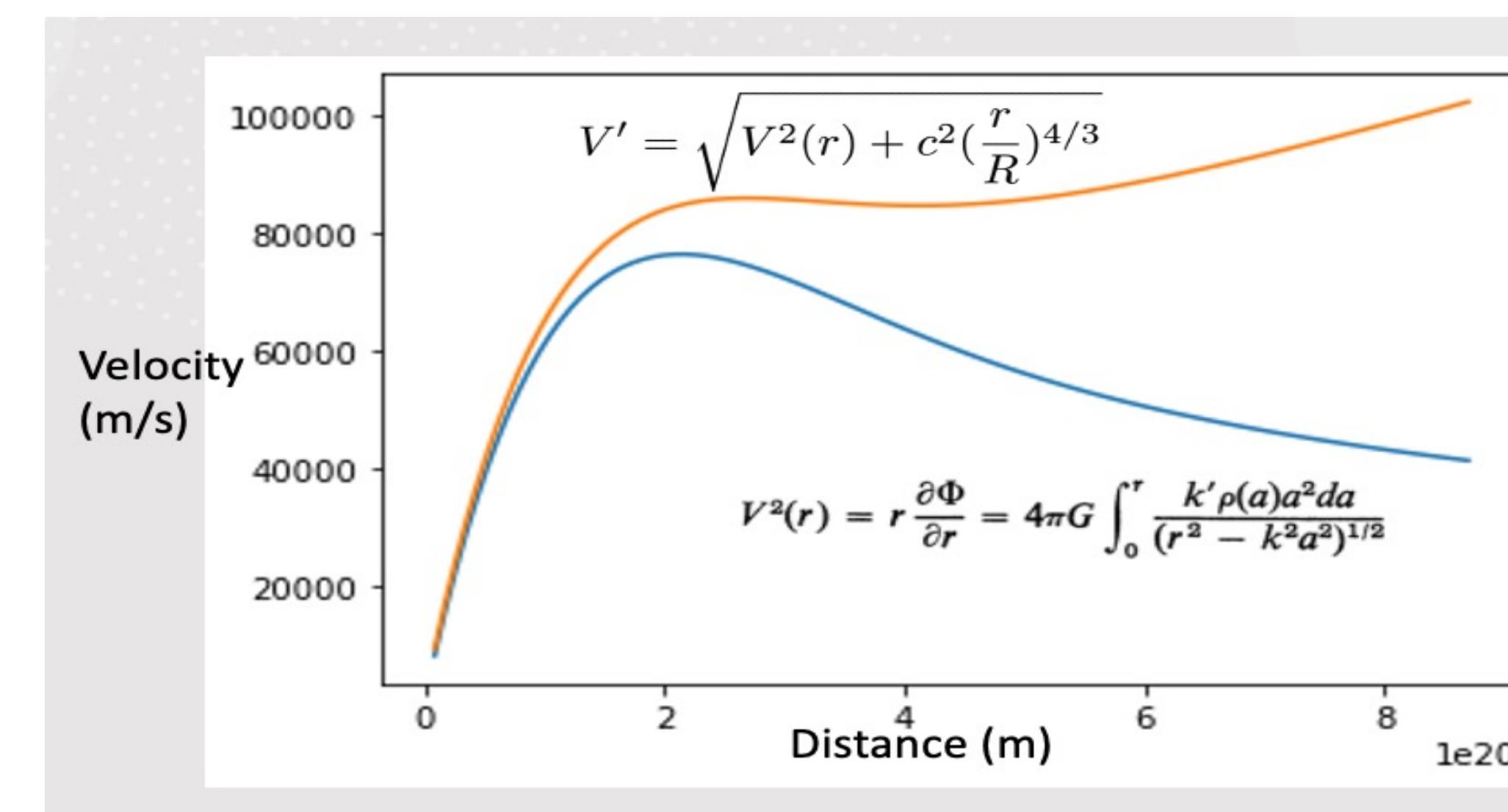
Stereographic Coordinates:



$$\sum_i x_i x_i + x_N x_N = R^2 \quad \xi^2 = \sum_i \xi_i \xi_i$$

$$x_i = \frac{\xi_i}{1 + \xi^2/4R^2}, \quad x_N = R \frac{1 - \xi^2/4R^2}{1 + \xi^2/4R^2}$$

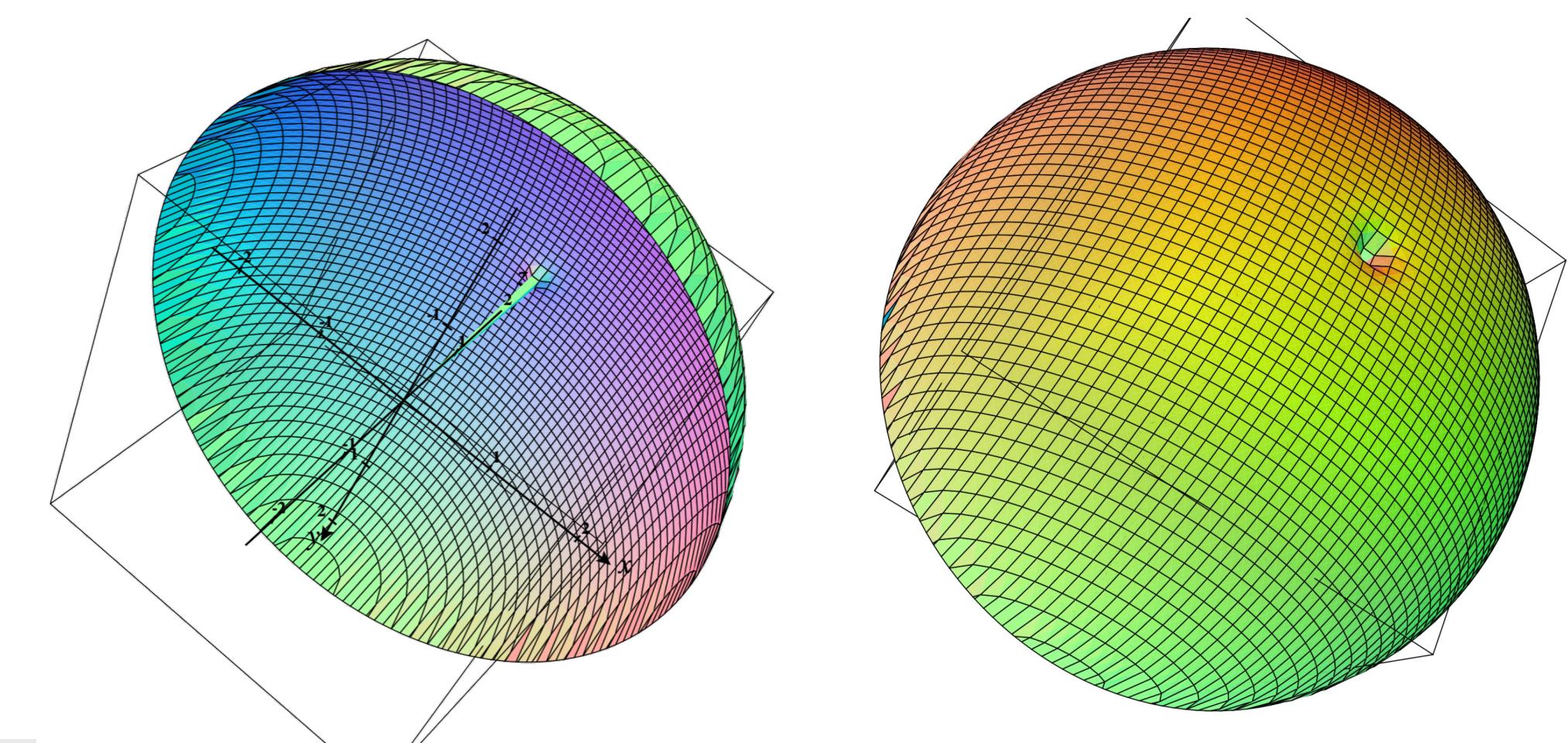
Galaxy Rotation Curves:



Dark Energy:

$$R = \left(\frac{3}{\Lambda} \right)^{1/2}$$

Non-Flat 5D Space with Gravity:



$$x^2 + y^2 + z^2 = R^2 \left(1 - \frac{0.01}{\sqrt{x^2 + y^2}} \right)$$

Conclusion

Dark matter and dark energy might be of the same nature, and they might be the product of the universe being a 4D hypersurface on a 5D hypersphere projected onto a 4D hyperplane.