NULL COSMOLOGY PREDICTION: VORTICAL MOTION OF M31

White paper, July 4, 2008
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Abstract: Null cosmology provides a specific and quantifiable description of galactic dynamics, arguing for the cosmic necessity of galactic vortical motion, wherein galaxies' disk material migrates slowly toward their core region. In this paper the author uses null cosmology to calculate the speed of the core-ward inflow of M31, the Andromeda galaxy, as 3.5 ± 0.7 km/s.

I. GALACTIC VORTEX

The relationship between a spiral galaxy's disk scale length h_R, vortical inflow rate v_r, and luminosity lifespan τ_L, is given by:[1]

$$v_r = \frac{h_R}{\tau_L} \tag{1}$$

where luminosity lifespan is defined as the luminosity weighted main-sequence lifespan of a galaxy's star population. Generally, the bluer a galaxy, the shorter its luminosity lifespan because most of its light is generated by hotter, more short-lived stars. The luminosity lifespan for the Milky Way's star population has been calculated as 2 Gyr.[2]

A galaxy's vortical disk motion enhances the variation of disk brightness with distance by increasing star population density toward the galaxy's center. This causes its actual disk scale length to appear smaller by a factor of approximately 1.2. A disk scale length measured at 10 Kpc, for instance, represents an actual scale length of 12 Kpc. Adding this provision to Equation (1) yields:

$$v_r = \frac{1.2 h_R}{\tau_L} \tag{2}$$

This is the expression that will be used to calculate the radial inflow rate of M31.

II. THE ANDROMEDA GALAXY, M31

The Andromeda galaxy is strikingly similar to our own galaxy, in terms of size, morphology, and color. It is approaching our solar system at a closing rate of 300 km/s.[3] As seen from Earth, Andromeda's disk is tilted 13° from edge on,[3] providing direct observational access to the motion of stars on both sides of its central region. It's disk scale length has been measure variously from 5 to 7 Kpc,[4] and we will use 6 Kpc for our calculation.

Andromeda is approximately the same color as the Milky Way, so its luminosity lifespan will be taken as the same, at 2 Gyr. Substituting these values into Equation (2) results in radial vortical inflow rate for Andromeda of 3.5 km/s. As viewed from Earth, Andromeda's proximate rim should appear to be approach ~7 km/s slower than its distant rim.

The greatest source of error in this calculation is our estimate of Andromeda's luminosity lifespan, and for this we will establish an error budget of ± 0.7 km/s based on calculations done for the Milky Way.

REFERENCES

[1] *Our Undiscovered Universe*, Terence Witt [Aridian Publishing, 2007], p. 333

[2] *Our Undiscovered Universe*, Terence Witt [Aridian Publishing, 2007], p. 332

[3] *Andromeda Galaxy*, Paul Hodge [Kluwer Academic, 1992]

[4] *Island Universes (Astrophysics and Space Science Proceedings)*, R.S. de Jong [Springer, 2006]