Quantum Gravity
Galactic Mass Spectrum II
Revised Version

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1 Abstract

A formula, derived from general relativity, is given that can be used to generate a cosmological mass spectrum. The spectrum values come out as kilograms and are determine by two input parameters galactic epoch birth time, t_b, and a scale factor θ_0.

Keywords: Dust Universe, Dark Energy, Dark Matter,
Newton's Gravitation Constant, Einstein's Cosmological Constant,
Cosmological Mass Spectra, Quantised Gravity, Black Holes

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2 Introduction

This short note is a follow up of the paper [1] on the problem of formulating the equations that describes the equilibrium of a gaseous material in a self gravitational equilibrium condition in the galaxy modelling context and in the formulation of a quantum theory of gravity. This note only gives a greatly improved formula for the galactic mass spectrum obtained in that previous paper. A full derivation of this formula will follow later. I am presenting it now, without discussion, as it seems to me to be a very interesting and exciting result in astronomical physics.

3 Updated Galactic Mass Spectrum Formula

Galaxies are assumed to have two distinct mass constituents, a D part formed from Einstein's mass density and a P part formed from Einstein's extra pressure originated mass density, $3P/c^2$. These parts are further assumed to be formed from a D type and a P type black hole interior together with the their D type and P type exteriors respectively.

The quantized gravity spherical harmonic function parameters (l, m) relation with the usual atomic quantum angular momentum harmonic function parameters (l', m) can take a mass density form, D, and and a pressure form, P, identified with Einstein's general relativity pressure term as follows,

$$D: \quad l' = 2l - 1 \tag{3.1}$$
$$P: \quad l' = 2(2l - 1) \tag{3.2}$$
$$l_D = (l' + 1)/2 \tag{3.3}$$
$$l_P = (l' + 2)/4 \tag{3.4}$$
$$-l' \leq m_{D/P} \leq l'. \tag{3.5}$$

The mass spectrum for a D type galaxy is given by

$$M_{l,m,D}(t_b) = \frac{R_\Lambda c^2 \sinh(3ct_b/(2R_\Lambda))(\epsilon_m(4l-1)\Gamma(2l-m))^{1/2}}{2G\theta_0^l(2l-1)^{2l}\left(\Gamma(2l+m)\right)^{1/2}} \times (1 + 3\epsilon_m(4l-1)\Gamma(2l-m)/((4l-3)\Gamma(2l+m)) \tag{3.6}$$

The mass spectrum for a P type galaxy is given by

$$M_{l,m,P}(t_b) = \frac{R_\Lambda c^2 \sinh(3ct_b/(2R_\Lambda))(\epsilon_m(8l-3)\Gamma(4l-1-m))^{1/2}}{2G\theta_0^{2l-1/2}(2l-1)^{8l-2}\left(\Gamma(4l-1+m)\right)^{1/2}} \times (1 + 3\epsilon_m(8l-3)\Gamma(4l-1-m)/((8l-5)\Gamma(4l-1+m)) \tag{3.7}$$

The combination of the two basic galaxy types just by addition gives the usual galaxy mass formation spectrum which involves both mass distribution types, $M_{l,m,D+P}(t_b)$,

$$M_{l,m,D+P}(t_b) = M_{l,m,D}(t_b) + M_{l,m,P}(t_b) \tag{3.8}$$

The ratio of the mass exterior to a galaxy's black hole to the mass interior to the galaxy's black hole for a D type galaxy is given by

$$R_{D,l,m} = \frac{3\epsilon_m(4l-1)\Gamma(2l-m)}{(4l-3)\Gamma(2l+m)}. \tag{3.9}$$

The ratio of the mass exterior to a galaxy's black hole to the mass interior to the galaxy's black hole for a P type galaxy is given by

$$R_{P,l,m} = \frac{3\epsilon_m(8l-3)\Gamma(4l-1-m)}{(8l-5)\Gamma(4l-1+m)}. \tag{3.10}$$

To print out a full galactic spectrum using the function $M_{l,m,D+P}(t_b)$ use the information above and assign a definite numerical value to the galactic birth time, t_b. A provisional value for θ_0 can be taken to be $\theta_0 = 2.97845$. The print out will contain as many spectral lines as determined by the top value of l for galaxies born at time t_b.

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References

[1] Gilson J. G., 2013, Galactic Classification
Quantum Gravity and Mass Spectra
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