The calculated values of the ratio of vacuum energy (dark energy) and unobservable matter (dark matter)

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ABSTRACT

The calculated values of the ratio of vacuum energy (dark energy - 0.7160) and unobservable matter (dark matter - 0.2140) in a combined FRW metric (static de Sitter and anti-de Sitter spacetimes with equal values of curvature radius)

The solution for the ratio of the vacuum energy and matter (observable and unobservable) was obtained for the combined FRI metric (+ / - De Sitter space), the resulting combination of static de Sitter and anti-de Sitter space with the same values of the radius of curvature. The result of combining - hypersphere with an external (positive values of mass / energy / time / reference) internal (negative values of mass / energy / time / coordinate) surfaces. At hypersphere distinguish two points - the North and South Pole and the two lines - the Northern Tropic and the Equator. The location of the observer - the North Pole. The radius of the hypersphere (R) Is numerically equal to the product of the age of the Universe at a constant speed of light. The distance from the North Pole to the North Tropic (the boundaries of the observed three-dimensional space) is equal to R, to the equator - half of pi multiplied by R and to the South Pole - pi, multiplied by R. Three-dimensional volume of the hypersphere is the sum of volumes of two spheres with centers in the North and South Poles, and radius equal to pi/2 multiplied by R. Since the Equator hypersphere - the horizon of the Universe, the volume of "South" sphere is not considered. Value is specified without the influence of large-scale density fluctuations of matter

The vacuum energy is

$$\mathrm{Ev{=}Vu\ \rho v{=}} \frac{\boldsymbol{4\pi}}{\mathbf{3}}\ \frac{\boldsymbol{\pi^3 R^3}}{\mathbf{8}}\ \frac{\boldsymbol{\Lambda_{ds} c^2}}{\boldsymbol{8\pi G}} = \frac{\mathbf{3}}{\mathbf{8}}\frac{\boldsymbol{c^4}}{\boldsymbol{\pi G}}\frac{\boldsymbol{4\pi}}{\mathbf{3}}\ \frac{\boldsymbol{\pi^3 R}}{\mathbf{8}} = \frac{\boldsymbol{\pi^3}}{\mathbf{16}}\ \frac{\boldsymbol{c^4 R}}{\boldsymbol{G}} \qquad (1)$$

The energy of the matter is

$$E_M = M_u c^2 = \frac{\pi}{2}\ \frac{Rc^2}{2G}\ c^2 = \frac{\pi}{4}\ \frac{\boldsymbol{c^4 R}}{\boldsymbol{G}} \qquad (2)$$

The ratio between the vacuum energy and total energy

$$\Omega_v = \frac{E_v}{E_v + E_M} = \frac{\frac{\pi^2}{4}}{\frac{\pi^2}{4}+1} = 0.7160\ 00 \qquad (3)$$

The ratio between energy of the matter and total energy

$$\Omega_M = \frac{E_M}{E_v + E_M} = \frac{1}{\frac{\pi^2}{4}+1} = 0.2884\ 00 \qquad (4)$$

The energy of matter consists of the observable matter, the limited sphere of radius R or in other the surface on a hypersphere inside the North Tropic and the unobserved matter that occupies on the hypersphere surface between the Northern Tropic and the Equator.

$$\Omega_M = \Omega_{Mo} + \Omega_{Muo} \qquad (5)$$

The relationship between the observable matter and total energy is equal to

$$\Omega_{Mo} = \frac{M_o}{M_u}\,\Omega_M = \frac{8}{\pi^3}\Omega_M = 0.2580 * 0.2884 = 0.0744\ 11\ (26\%) \quad (6)$$

The relationship between the unobserved matter and total energy is equal to

$$\Omega_{Muo} = \frac{M_{uo}}{M_u}\,\Omega_M = \Omega_M - \Omega_{Mo} = 0.2884 - 0.0744 = 0.2139\ 89\ (74\%) \quad (7)$$

The resulting solution indicates the absence a(t) in the relations between the three components of total energy, which indicates the stability of the model, and the presence of a(t) for the gravitational and some other constants with all consequences, not included in this note.

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