A simple note on the pair quasar-galaxy NGC 7319

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A few years ago was discovered [1] a pair quasar-galaxy NGC 7319 with different redshifts, this fact, which is contrary to the law of Hubble and therefore to the Bing Bang model, could be explained by the gravitational redshift.

Key words: gravitational redshift.

According to the gravitational redshift [2]

$$z = \frac{v_{eph}}{c} = \frac{-\frac{\varphi}{c}}{c} = -\frac{\varphi}{c^2} = -\frac{-\frac{GM}{R}}{c^2} = \frac{GM}{Rc^2} \qquad \text{(N.1)}$$

being z the light redshift parameter, v_{eph} the escape velocity of the photon, c the velocity of the light in the vacuum, φ the gravitational potential, G the gravitational constant of Newton, and M and R the mass and the radius of the light source, respectively. Hence, for the pair quasar-galaxy

$$\frac{z_q}{z_g} = \frac{\frac{GM_q}{R_q c^2}}{\frac{GM_g}{R_g c^2}} = \frac{\frac{M_q}{R_q}}{\frac{M_g}{R_g}} \qquad \text{(N.2)}$$

For homogeneous and isotropic sources

$$M = \rho \frac{4}{3} \pi R^3 \qquad \text{(N.3)}$$

being ρ the mass density of the source. Hence

$$\frac{z_q}{z_g} = \frac{\frac{M_q}{R_q}}{\frac{M_g}{R_g}} = \frac{\rho_q \frac{4}{3} \pi R_q^{\,2}}{\rho_g \frac{4}{3} \pi R_g^{\,2}} = \frac{\rho_q R_q^{\,2}}{\rho_g R_g^{\,2}} \qquad \text{(N.4)}$$

From [1], $\frac{z_q}{z_g} = \frac{2.114}{0.0225} \approx 94$, therefore, from (N.2), $M_q \approx 94 \frac{R_q}{R_g} M_g$, or from (N.4), $\rho_q \approx 94 \left(\frac{R_g}{R_q} \right)^2 \rho_g$, both equations are equivalents. If any of these two equations would be true then the cause of this observed event would be the gravitational redshift.

The empirical law of Hubble is stated as [2] $v_r = Hd$, where v_r is the velocity of recession, namely the speed at which a light source moves away from the observer, due to the expansion of the space between them; *H* is the constant of Hubble, and *d* is the distance between the observer and the light source. According to this law [2], $z = \frac{v_r}{c} = \frac{Hd}{c}$, the quasar, that has been observed [1] in front of the galaxy, would be almost 94 times ($\frac{d_q}{d_g} = \frac{2.114}{0.0225} \approx 94$) more away from us than the galaxy, which not seems to be the case.

[1] Pasquale Galianni, E. M. Burbidge, H. Arp, V. Junkkarinen, G. Burbidge and Stefano Zibetti, The Discovery of a High Redshift X-Ray Emitting QSO Very Close to the Nucleus of NGC 7319, arXiv: astro-ph/0409215v1 (2004).

[2] José Francisco García Juliá, Simple Considerations on the Cosmological Redshift, Apeiron, Vol. 15, No. 3, July 2008, 325-337.