The Observable Universe Mass, and Radius

H. Vic Dannon
vic0user@gmail.com
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Abstract In terms of the sun mass and radius, the deflection angle of light passing by the sun is

$$\approx 2\frac{1}{c^2}G\frac{M_{sun}}{R_{sun}}$$ [1]

in terms of the observable universe mass and radius, the deflection angle of light passing by the sun is

$$\approx 2\frac{1}{c^2}G\frac{M_{universe}}{R_{universe}}.$$

Therefore,

$$\frac{M_{universe}}{R_{universe}} \approx \frac{M_{sun}}{R_{sun}}$$

Using Wikipedia values,

$$\frac{M_{sun}}{R_{sun}} \approx \frac{(1.988416)10^{30}kg}{(6.95700)10^{8}\mathrm{m}} = (2.8581515)10^{21}$$

$$\frac{M_{universe}}{R_{universe}} \approx \frac{(1.5)10^{53}kg}{(4.4)10^{26}\mathrm{m}} = (3.4090909)10^{26}.$$

[1] H. Vic Dannon, The Deflection of Light by the Sun Follows From Newton's Gravitation Alone, And Does Not Involve or Confirm General Relativity Gauge Institute Journal, May 2025

But the values for the mass and the radius of the Universe are not dependable as the values for the mass and the radius of the Sun. Therefore, we conclude that

$$\frac{M_{universe}}{R_{universe}} \approx (2.8581515)10^{21}$$

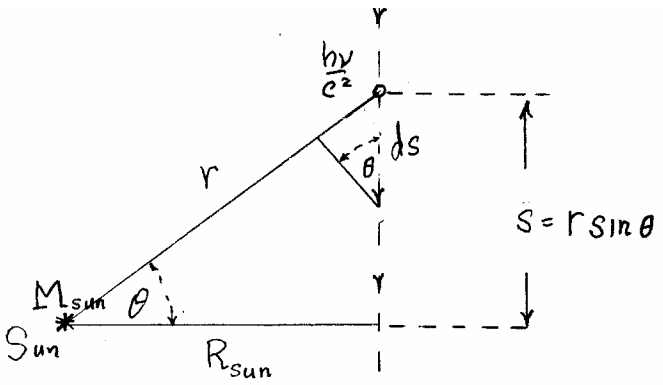
1.

The Deflection Angle of a Photon from the Observable Universe

An observable universe photon with frequency ν, and mass

$$\frac{h\nu}{c^2}$$

is passing by the Sun



The photon is attracted to the Universe by the Gravitational Force

$$F = G\frac{M_{universe}\dfrac{h\nu}{c^2}}{r^2}$$

$$= G\frac{M_{universe}\dfrac{h\nu}{c^2}}{\left(\dfrac{R_{universe}}{\cos\theta}\right)^2}$$

$$= \frac{h\nu}{c^2}G\frac{M_{universe}}{R_{universe}^2}\cos^2\theta$$

This force applies along the infinitesimal distance

$$(ds)\cos\theta = d(R_{universe}\tan\theta)\cos\theta$$
$$= R_{universe}\frac{d\theta}{\cos^2\theta}\cos\theta$$

The Gravitational Energy due to this Force along $ds\cos\theta$ is

$$Fds\cos\theta = \left(\frac{h\nu}{c^2}G\frac{M_{universe}}{R^2_{universe}}\cos^2\theta\right)\left(R_{universe}\frac{d\theta}{\cos\theta}\right)$$

$$= \frac{h\nu}{c^2}G\frac{M_{universe}}{R_{universe}}\cos\theta d\theta$$

This infinitesimal change in the gravitational energy equals the infinitesimal change in the radiation energy,

$$hd\nu = \frac{h\nu}{c^2}G\frac{M_{universe}}{R_{universe}}\cos\theta d\theta$$

$$\frac{d\nu}{\nu} = \frac{1}{c^2}G\frac{M_{universe}}{R_{universe}}\cos\theta d\theta$$

The speed of a photon with wavelength λ and frequency ν is

$$c = \lambda\nu\,.$$

Assuming that

$$dc \approx \lambda d\nu\,,$$

the infinitesimal deflection angle of the photon is

$$d\alpha \approx \tan(d\alpha)$$

$$= \frac{dc}{c}$$

$$\approx \frac{\not{\lambda}d\nu}{\not{\lambda}\nu}$$

$$\approx \frac{1}{c^2} G \frac{M_{universe}}{R_{universe}} \cos\theta d\theta$$

The total deflection of the photon path is

$$\sum_{\theta=-\pi/2}^{\theta=\pi/2} (d\alpha) \approx \int_{\theta=-\frac{\pi}{2}}^{\theta=\frac{\pi}{2}} \frac{1}{c^2} G \frac{M_{universe}}{R_{universe}} \cos\theta d\theta$$

$$= \frac{1}{c^2} G \frac{M_{universe}}{R_{universe}} \underbrace{\int_{\theta=-\frac{\pi}{2}}^{\theta=\frac{\pi}{2}} \cos\theta d\theta}_{2}$$

$$= 2 \frac{1}{c^2} G \frac{M_{universe}}{R_{universe}}$$

2.

The Observable Universe Mass, and Radius

In terms of the Universe mass and radius the deflection angle is.

$$2\frac{1}{c^2}G\frac{M_{universe}}{R_{universe}}$$

In terms of the Sun mass and radius the deflection angle is.

$$2\frac{1}{c^2}G\frac{M_{sun}}{R_{sun}}$$

Therefore,

$$2\frac{1}{c^2}G\frac{M_{universe}}{R_{universe}}=2\frac{1}{c^2}G\frac{M_{sun}}{R_{sun}}$$

$$\frac{M_{universe}}{R_{universe}}=\frac{M_{sun}}{R_{sun}}$$

Using Wikipedia values,

$$\frac{M_{sun}}{R_{sun}}\approx\frac{(1.988416)10^{30}kg}{(6.95700)10^{8}\mathrm{m}}=(2.8581515)10^{21}$$

$$\frac{M_{universe}}{R_{universe}}\approx\frac{(1.5)10^{53}kg}{(4.4)10^{26}\mathrm{m}}=(3.4090909)10^{26}.$$

But the values for the mass and the radius of the Universe are not dependable as the values for the mass and the radius of the Sun. Therefore, we conclude that

$$\frac{M_{universe}}{R_{universe}} \approx (2.8581515)10^{21}$$

References

[Dannon] H. Vic Dannon, The Deflection of Light by the Sun Follows From Newton's Gravitation Alone, And Does Not Involve or Confirm General Relativity Gauge Institute Journal, May 2025

Wikipedia, Solar Mass
https://en.wikipedia.org/wiki/Solar_mass

Wikipedia, Solar Radius
https://en.wikipedia.org/wiki/Solar_mass

Wikipedia, Observable Universe
https://en.wikipedia.org/wiki/Observable_universe