

# Real dimension in numerical Newtonian gravitation

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## Abstract

This paper contains a short introduction to Newtonian gravitation. The main focus is on some C++ code.

## 1 Brute force: integer field line count

Regarding the holographic principle, where  $n$  is the gravitational field line count, and  $A_s$  is the Schwarzschild black hole event horizon area:

$$n = \frac{A_s k c^3}{4G\hbar \log 2}, \quad (1)$$

the Schwarzschild radius is:

$$r_s = \sqrt{\frac{A_s}{4\pi}} = \sqrt{\frac{nG\hbar \log 2}{kc^3\pi}}, \quad (2)$$

and the mass is:

$$M = \frac{c^2 r_s}{2G} = \sqrt{\frac{nc\hbar \log 2}{4Gk\pi}}. \quad (3)$$

Where  $R$  is some far distance from the centre of the gravitating body (e.g,  $R \gg r_s$ ),  $\beta$  is the get intersecting line length function and  $\epsilon$  is some small value (e.g  $10^{-5}$ ), the gradient is:

$$\gamma = \frac{\beta(R + \epsilon) - \beta(R)}{\epsilon}. \quad (4)$$

The gradient strength is:

$$g = -\gamma\pi = \frac{n}{2R^3}. \quad (5)$$

From this we can get the Newtonian acceleration  $a$  for a flat rotation curve of speed  $v$ :

$$a = \frac{v^2}{R} = \frac{gRc\hbar \log 2}{k2\pi M}, \quad (6)$$

$$v = \sqrt{\frac{gR^2c\hbar \log 2}{k2\pi M}}. \quad (7)$$

For example, where  $D = 2.001$ , the ratio of  $a_D/a_3$  is equal to  $R^d$  where  $d = 3 - D = 0.999$ . Here  $d$  stands for disk-like.

The code for this section can be downloaded from:

[https://github.com/sjhalayka/ellipsoid\\_emitter](https://github.com/sjhalayka/ellipsoid_emitter)

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# References

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