Consider the variational integral for the shortest light time between two points in a generalized 2D space:

$$T = \frac{1}{c}\int_{x_1}^{x_2} \sqrt{1+\left(\frac{d}{dx}y(x)\right)^2}\, dx$$

If we consider a function which distorts normal Euclidean space in the following way:

$$P(x, y(x)) = 1 - \frac{\alpha \cdot mG}{v^2\sqrt{x^2 + y(x)^2}}$$

where to make physical sense this distortion must be a dimensionless function, and it should distort space with a 1/r dependence. It is formed like 1-A so that at large ‘r’, the distortion of space is unity. If we consider a photon of speed ‘c’ scattering through a field created by a mass ‘m’ then the Buckingham-π Theorem gives:

$$P(x, y(x)) = 1 - \frac{2mG}{c^2\sqrt{x^2 + y(x)^2}}$$

Then the function has the form:

$$T = \frac{1}{c}\int_{x_1}^{x_2} \frac{\sqrt{1+\left(\frac{d}{dx}y(x)\right)^2}}{\left(1 - \frac{2\,mG}{c^2\sqrt{x^2+y(x)^2}}\right)} dx \;\rightarrow\; L = \frac{\sqrt{1+\left(\frac{d}{dx}y(x)\right)^2}}{\left(1 - \frac{2\,mG}{c^2\sqrt{x^2+y(x)^2}}\right)}$$

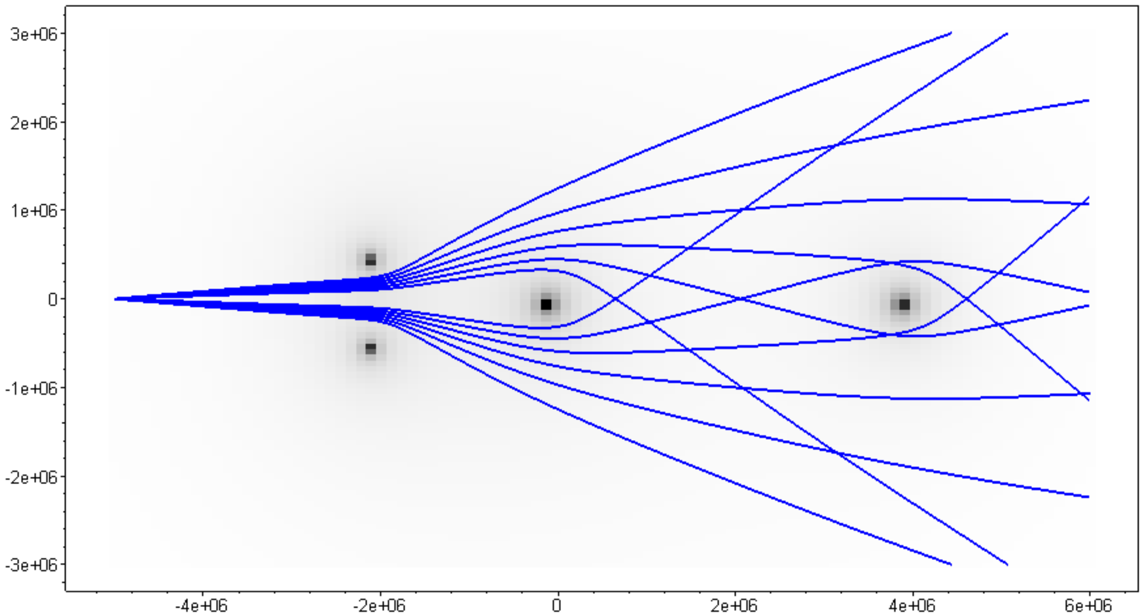
then…

$$\frac{\partial L}{\partial y} - \frac{d}{dx}\left(\frac{\partial L}{\partial y_x}\right) = 0$$

where this gives the following DE:

$$0 = \frac{2\,mG(y_x \cdot x - y)}{\left(x^2+y^2\right)^{3/2} c^2 - 2\,mG\left(x^2+y^2\right)} + \frac{y_x^2 y_{xx}}{\left(1+y_x^2\right)^2} - y_{xx}$$

For realistic values of ‘m’, ‘x_1’ and ‘$x`_1$’, DE yields the following (multiple masses, photonic pathes)



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