In 1801, **Johann Georg von Soldner** found[1]:
light passing a mass gets deflected by

$$\tan\frac{\Delta\theta_N}{2} = \frac{1}{\sqrt{4\rho_p(\rho_p-1)}} \therefore \Delta\theta_N \approx \frac{1}{\sqrt{\rho_p(\rho_p-1)}} \approx \frac{1}{\rho_p}$$

($\rho_p =$ periapsidal distance divided by Schwarzschild radius, same for any ρ below).

Laurent series @$\rho_p = \infty$: $\boldsymbol{\Delta\theta_N = \frac{1}{\rho_p}} + \frac{1}{2\rho_p^2} + \frac{7}{24\rho_p^3} + \mathcal{O}\left(\frac{1}{\rho_p^4}\right)$

In 1911, **Albert Einstein** — a.f.a.i.k. unaware of Soldner's publication — found the same $1/\rho_p$, based on his $E = mc^2$, his Eq. Pr., and Huygens' principle[2].

In 1915, his *general theory of relativity* — for which he needed a behemoth named tensor calculus — yielded a value twice as large[3],

i.e.: $\boldsymbol{\Delta\theta_E \approx \frac{2}{\rho_p} \approx 2\Delta\theta_N}$

which in 1919, on the 29th of May[4], was confirmed by observation by Arthur Eddington.

---

[1] See: http://henk-reints.nl/astro/HR-Newtonian-gravitational-lensing.pdf
[2] See: https://einsteinpapers.press.princeton.edu/vol3-doc/523
[3] See: https://articles.adsabs.harvard.edu/pdf/1915SPAW.......831E
[4] See: https://www.youtube.com/watch?v=YssgAfNJaZU

Let's now totally ignore Einstein's relativity:

Wouldn't *sunlight*, emitted horizontally (as seen overthere)
by the **sun's edge**, undergo the ***very same*** deflection
as *starlight* coming from far beyond & skimming it?

Wouldn't that enlarge the sun's *apparent* radius
by the ***very same*** angle as this deflection of starlight?

Wouldn't this ***autolensing*** apparently expand the entire sun?

Wouldn't it be that the sun's edge may also be a fictitious one?

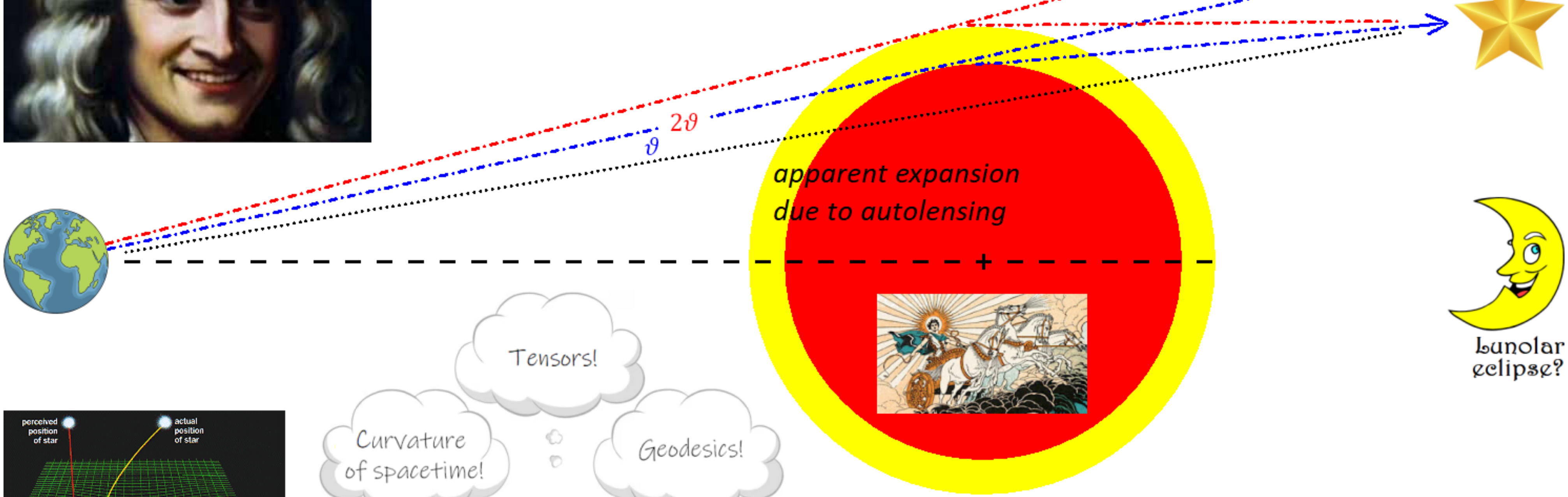
Wouldn't this apply to both incoming and outgoing light?

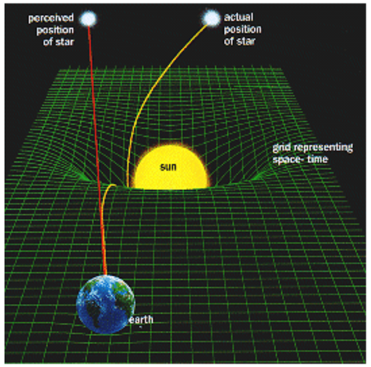
Wouldn't this seemingly push the perihelion away by the ***same***
observation angle as the deflection of the ray of starlight?

Wouldn't this *autolensing*, together with the bending of
the starlight, render a factor of **2**, as found by Einstein?

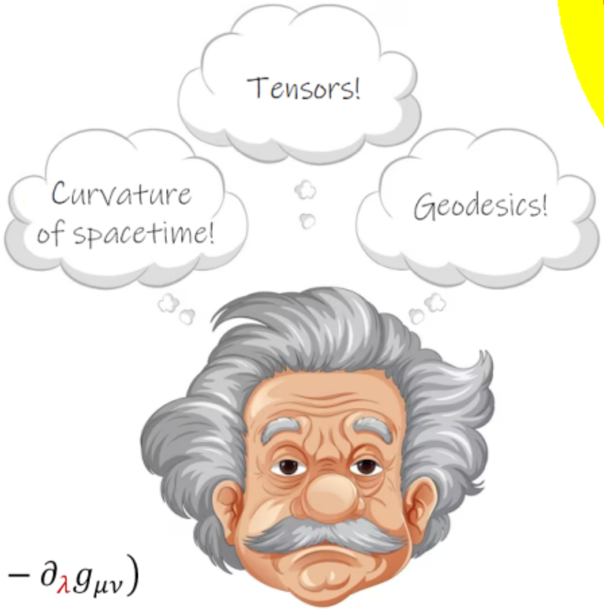
Wouldn't Soldner, precisely twice, suffice for thy wise nice eyes?

Et lux perpetua...





$$\Gamma^{\alpha}_{\mu\nu} = \frac{1}{2} g^{\alpha\lambda}\left(\partial_\mu g_{\nu\lambda} + \partial_\nu g_{\mu\lambda} - \partial_\lambda g_{\mu\nu}\right)$$



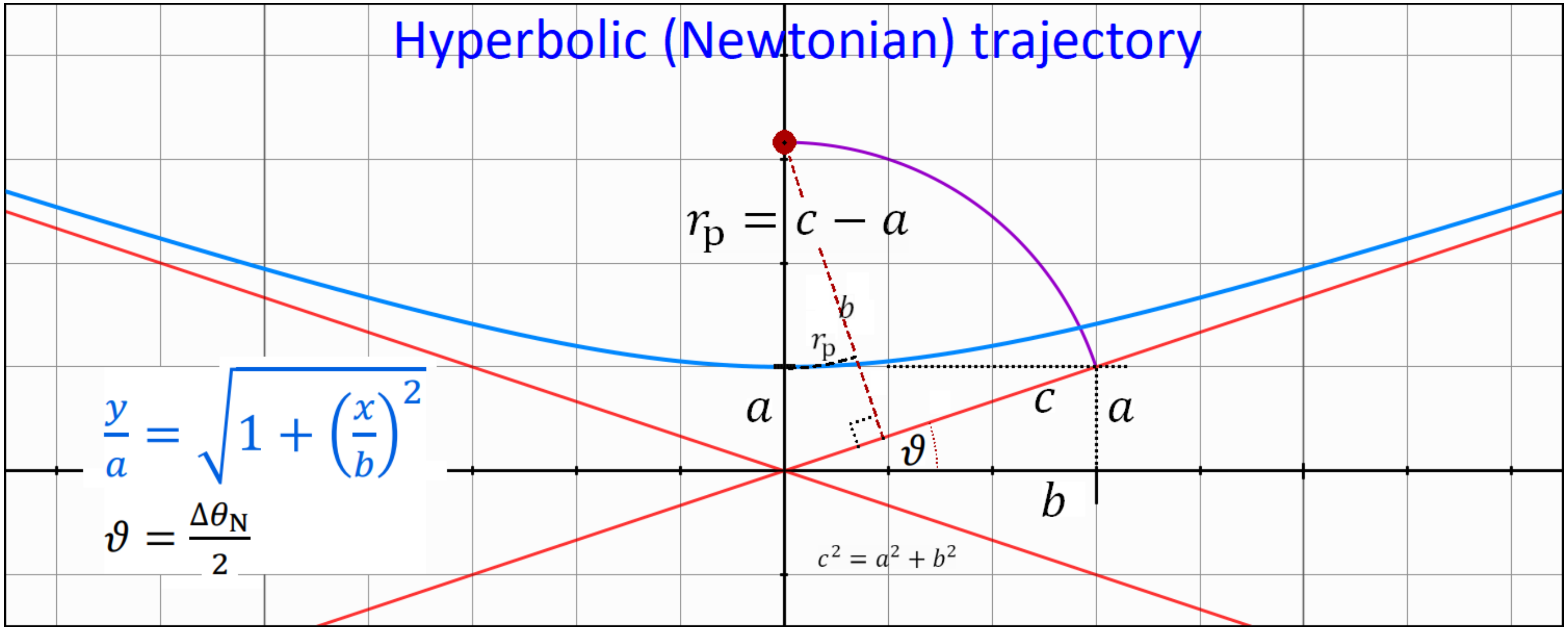
Isaacus Newtonus:

Natura enim ſimplex eſt.

Von Soldner's solution: $\tan\frac{\Delta\theta_N}{2} = \frac{1}{2}\cdot\frac{1}{\sqrt{\rho_p(\rho_p-1)}}$

Gravitational length contraction is by: $\sqrt{(1-1/\rho)}$

hence: $\varrho_p = \rho_p\sqrt{(1-1/\rho_p)} = \sqrt{\rho_p(\rho_p-1)}$



$(0,c) =$ focal point, where M resides;
Light, actually going through $(0,a)$, appears to come from $(0,0)$.

Hyperbola: $y = a \cdot \sqrt{1 + x^2/b^2}$

asymptote: $\frac{a}{b} = \tan\frac{\Delta\theta_N}{2} = \frac{1}{\sqrt{4\rho_p(\rho_p - 1)}} = \frac{1}{\sqrt{4\rho_p^2 - 4\rho_p}}$ (Soldner)

hence: $b = a \cdot \sqrt{4\rho_p^2 - 4\rho_p} \quad \therefore b^2 = a^2(4\rho_p^2 - 4\rho_p)$

therefore: $c^2 = a^2 + b^2 = a^2 + a^2(4\rho_p^2 - 4\rho_p) = a^2(4\rho_p^2 - 4\rho_p + 1)$

$= a^2(2\rho_p - 1)^2$

yielding: $c = a(2\rho_p - 1)$ ($c =$ dist. from focus to directrix $=$ from mass to apparent lgt. src.)

We also have: $c = r_p + a = \rho_p r_S + a$ ($a =$ dist. from periapsis to directrix)

hence: $2\rho_p a - a = \rho_p r_S + a$

or: $\rho_p r_S = 2\rho_p a - 2a = 2(\rho_p - 1)a$

yielding: $a = \frac{\rho_p r_S}{2(\rho_p - 1)}$

Therefore: $\boldsymbol{c} = \frac{\rho_p r_S}{2(\rho_p - 1)}(2\rho_p - 1) = \boldsymbol{\rho_p r_S \frac{2\rho_p - 1}{2\rho_p - 2}}$

(no, not the speed of light, smart arse!)

This result yields: $\boldsymbol{\frac{c}{r_\mathrm{p}}} = \frac{c}{\rho_\mathrm{p} r_\mathrm{S}} = \boldsymbol{\frac{2\rho_\mathrm{p}-1}{2\rho_\mathrm{p}-2}}$, which is an apparent ***expansion***

from $\boldsymbol{r_\mathrm{p}}$ to $\boldsymbol{r_\mathrm{p}+a}$ due to the deflection of light, as seen from great distance.

The sun seems larger! Its true radius is 696340.5 km instead of 696342 $\pm$ 40 km[5].

But, as seen from ∞, the straight line of sight is tangential to the sun, so we should project the focus onto the asymptote instead of the directrix and calculate b/r_p :

We have: $\frac{r_\mathrm{p}^2}{b^2} = \frac{(c-a)^2}{c^2-a^2} = \frac{(c-a)(c-a)}{(c+a)(c-a)} = \frac{c-a}{c+a} = \frac{c/a-1}{c/a+1}$

Soldner found: $\frac{a}{b} = \frac{1}{2\cdot\sqrt{\rho_\mathrm{p}(\rho_\mathrm{p}-1)}} \therefore \left(\frac{a}{b}\right)^2 = \frac{a^2}{c^2-a^2} = \frac{1}{4\rho_\mathrm{p}(\rho_\mathrm{p}-1)}$

cross multiplying yields: $c^2 - a^2 = a^2 \cdot 4\rho_\mathrm{p}(\rho_\mathrm{p}-1)$

i.e.: $c^2 = a^2 + 4a^2\rho_\mathrm{p}(\rho_\mathrm{p}-1)$

so: $c^2/a^2 = 1 + 4\rho_\mathrm{p}^2 - 4\rho_\mathrm{p} = (2\rho_\mathrm{p}-1)^2$

yielding: $c/a = 2\rho_\mathrm{p} - 1$

hence: $\frac{r_\mathrm{p}^2}{b^2} = \frac{c/a-1}{c/a+1} = \frac{(2\rho_\mathrm{p}-1)-1}{(2\rho_\mathrm{p}-1)+1} = \frac{2\rho_\mathrm{p}-2}{2\rho_\mathrm{p}} = \frac{\rho_\mathrm{p}-1}{\rho_\mathrm{p}} = 1 - \frac{1}{\rho_\mathrm{p}}$

therefore: $\boldsymbol{b/r_\mathrm{p} = 1/\sqrt{1-1/\rho_\mathrm{p}}}$

Doesn't the black hole equation contain $1/\sqrt{1-2GM/rc^2} = 1/\sqrt{1-1/\rho}$?

5 https://manoa.hawaii.edu/news/article.php?aId=4992

Local obs.: distance (perpendicular to line of sight) from focus to actual trajectory;
from ∞: distance to straight line of sight is larger than what's locally observed, so local size (i.e. *true* size) is smaller than what's perceived from far away.

The reciprocal of *expansion* is *contraction*. **Gravitational length contraction!**

Laurent series at infinity:

r_p/c: $\frac{2\rho_\mathrm{p}-2}{2\rho_\mathrm{p}-1} = 1 - \frac{1}{2\rho_\mathrm{p}} - \frac{1}{4\rho_\mathrm{p}^2} - \frac{1}{8\rho_\mathrm{p}^3} - \mathcal{O}\left(\frac{1}{\rho_\mathrm{p}^4}\right)$

$\boldsymbol{r_\mathrm{p}/b} \equiv$ Schwarzschild: $\sqrt{(\mathbf{1}-\mathbf{1}/\boldsymbol{\rho})} = \mathbf{1} - \frac{\mathbf{1}}{\mathbf{2}\boldsymbol{\rho}} - \frac{1}{8\rho^2} - \frac{1}{16\rho^3} - \mathcal{O}\left(\frac{1}{\rho^4}\right)$

In http://henk-reints.nl/astro/HR-general-relativity-and-black-holes.pdf ,
I derive the ***correct*** & exact contraction factor: $\frac{\mathbf{2}\boldsymbol{\rho}}{\mathbf{2}\boldsymbol{\rho}+\mathbf{1}} = \mathbf{1} - \frac{\mathbf{1}}{\mathbf{2}\boldsymbol{\rho}} + \frac{1}{4\rho^2} - \frac{1}{8\rho^3} + \mathcal{O}\left(\frac{1}{\rho^4}\right)$

Von Soldner unknowingly accurately predicted gravitational length contraction as well as the event horizon (he *did* find the Schwarzschild root) ***when tensor calculus did not yet exist!***

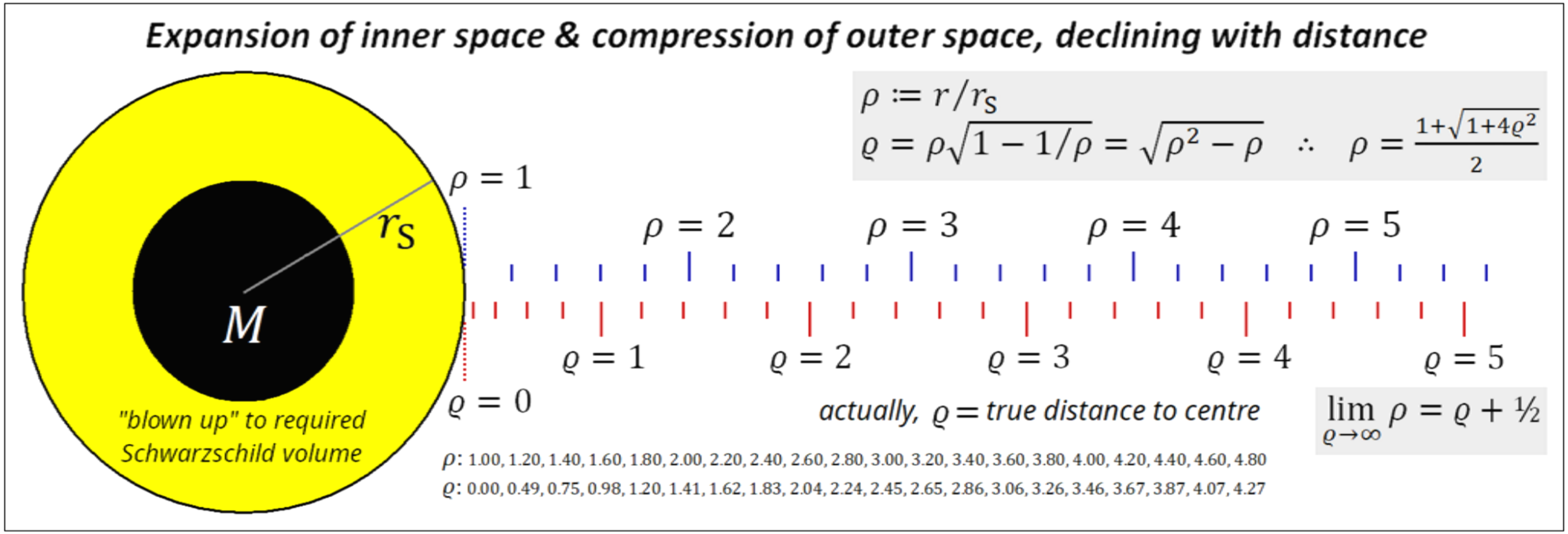
Bye Bye'nstein...

Note: Von Soldner's solution cannot be exact since it presumes a Newtonian hyperbolic trajectory, implying an increasing/decreasing velocity towards/beyond periapsis, but Einstein's *principle of the constancy of the speed of light* prohibits such. But he found the very same as Schwarschild...?! Hat der Karl sich geirrt[6]?

[6] Don't understand German? Your problem...☺ Tip: Google Translate...

Gravitational length contraction:

As seen from great distance, space directly around a mass is actually expanded by $1/\sqrt{1-1/\rho}$. The central point is blown up to r_S , thus radially compressing its outer space towards ∞ by $\sqrt{1-1/\rho}$, where ρ is as observed from ∞ .



Matter & empty space are mutually exclusive, so a mass says:

Here I am and I require at least my Schwarzschild volume in order to exist, so go away, emptyness!

But isn't it actually an optical illusion due to the bending of light?

Emptyness and ***matter*** apparently **repel one another.** Concentric spherical shells of emptyness get pushed outwards, radially compressing each shell's thickness from the inside out. With $A \propto r^2$, emptyness then gets volumetrically ***diluted*** by:

$\xi := \lim_{\Delta\varrho\to 0} \frac{[\rho(\varrho+\Delta\varrho)]^3-[\rho(\varrho)]^3}{(\varrho+\Delta\varrho)^3-\varrho^3}$. We find: $\xi > 1$ and: $\lim_{\varrho\to\infty} \xi = 1$.

The farther away from a mass, the less diluted emptyness will be.

Παραδοξ:

Increasing volume decreases the density of its content,
leaving less of the latter in each unit of volume,
which implies it will become emptier.

Increasing an empty volume then decreases the
density of its emptyness, making it even emptier.

Decreasing emptyness yields more emptyness…

Bodies would (peristaltically) be "squeezed" towards one another, i.e. emptyness seems to push them towards more diluted = thinner emptyness.

Gravitation would be an inevitable consequence of the obvious incompatibility of matter and emptyness.

Emptyness[7] seems to behave like **something**, but *not* matter.

Nihil, sed tamen aliquid = *nothing, but yet* **something.**

Suggested name for this **something**:

Quilida.

Dutch: "Kwetokniwa'tis".

---

[7] *Emptyness ≔ absence of matter*
(as a matter of fact, it **does** matter that it isn't matter, no matter what).

Masses don't ***pull*** one another (the Newtonian way), but they are ***pushed*** together via the thinness gradient of 𝔔𝔲𝔦𝔩í𝔡𝔞.

Einstein's curved spacetime, in which masses follow geodesics, merely is a rather complicated *mathematical* way of ***describing*** gravitation, but it does ***not explain*** it.

What if the speed of light *decreases* when 𝔔𝔲𝔦𝔩í𝔡𝔞 gets *diluted*?

IF $\varepsilon_r\mu_r = \xi > 1$ or $\sqrt{\varepsilon_r\mu_r} = \xi > 1$, then either $\sqrt{\xi}$ or ξ would be a refractive index. ***Thinner*** 𝔔𝔲𝔦𝔩í𝔡𝔞 would then be an optically ***denser*** medium, which makes it similar to a normal optical lens.

A numerical ray trace with ξ as refractive index ***correctly*** *rendered twice* 𝔖𝔬𝔩𝔡𝔫𝔢𝔯*'s solution*! ☺ 👍

See http://henk-reints.nl/astro/HR-Deflected-light-stuff.pdf .

Every answer yields a new question.

What ~~on Earth~~ in the cosmos is Quilida?

I have always rejected virtual particles because they have, like phlogiston, not been deduced from ascertained truths.

To me, the Casimir effect confirms his original derivation, i.e. relativistic Van der Waals forces.

But maybe Quilida is some sort of substantiation?

However, I am so clever to never ever make an effort to endeavour whatever brainchild's "proof", since

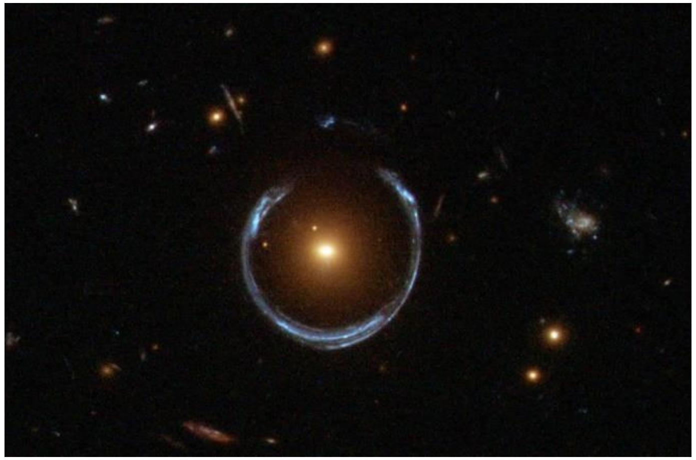
***all* assumptions sprout from nescience, hence they have *nothing* to do with science.**

Less diluted Quilida outside orbit

avoids planets going off the rails.

Thicker Quilida *pushes* them inwards.

Deflection of light:



Observed *Einstein ring = a* ***fact***

Deflection of the mind:

Senseless fabricated precious crap

Please read more details in: http://henk-reints.nl/astro/HR-Deflected-light-stuff.pdf .

Henk Reints

[Henk-Reints.nl](http://henk-reints.nl)