JULY 1, 1935 PHYSICAL REVIEW VOLUME 48

The Particle Problem in the General Theory of Relativity

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(Received May 8, 1935)

§2. THE SCHWARZSCHILD SOLUTION

As is well known, Schwarzschild found the spherically symmetric static solution of the gravitational equations

$$ds^2 = -\frac{1}{1-2m/r}dr^2 - r^2(d\theta^2+\sin^2\theta d\phi^2) + (1-2m/r)dt^2, \quad (5)$$

($r>2m$, θ from 0 to π, ϕ from 0 to 2π); the vari-

If one introduces in place of r a new variable according to the equation

$$u^2 = r - 2m,$$

one obtains for ds^2 the expression

$$ds^2 = -4(u^2+2m)du^2 - (u^2+2m)^2(d\theta^2+\sin^2\theta d\phi^2) + \frac{u^2}{u^2+2m}dt^2. \quad (5a)$$

It should be obvious that u^2 has dimension $[\mathrm{LENGTH}]$,

hence u has dimension $\sqrt{[\mathrm{LENGTH}]}$.

This implies that u definitely is *not* a *normal* spatial dimension!

But what are Einstein & Rosen doing?

As u varies from $-\infty$ to $+\infty$, r varies from $+\infty$ to $2m$ and then again from $2m$ to $+\infty$. If one tries to interpret the regular solution (5a) in the space of r, θ, ϕ, t, one arrives at the following conclusion. The four-dimensional space is described mathematically by two congruent parts or "sheets," corresponding to $u>0$ and $u<0$, which are joined by a hyperplane $r=2m$ or $u=0$ in which g vanishes.[2] We call such a connection between the two sheets a "bridge."

Nowadays, this bridge is called a **wormhole**.

Mathematically, it is perfect, but it has nothing to do with physics.

u is neither spatial nor timelike, said otherwise: it's **flapdoodle**.

A wormhole is not to be considered physically possible at all.

But it is Einstein himself

who is mentioned as the primary author!

Yeah.

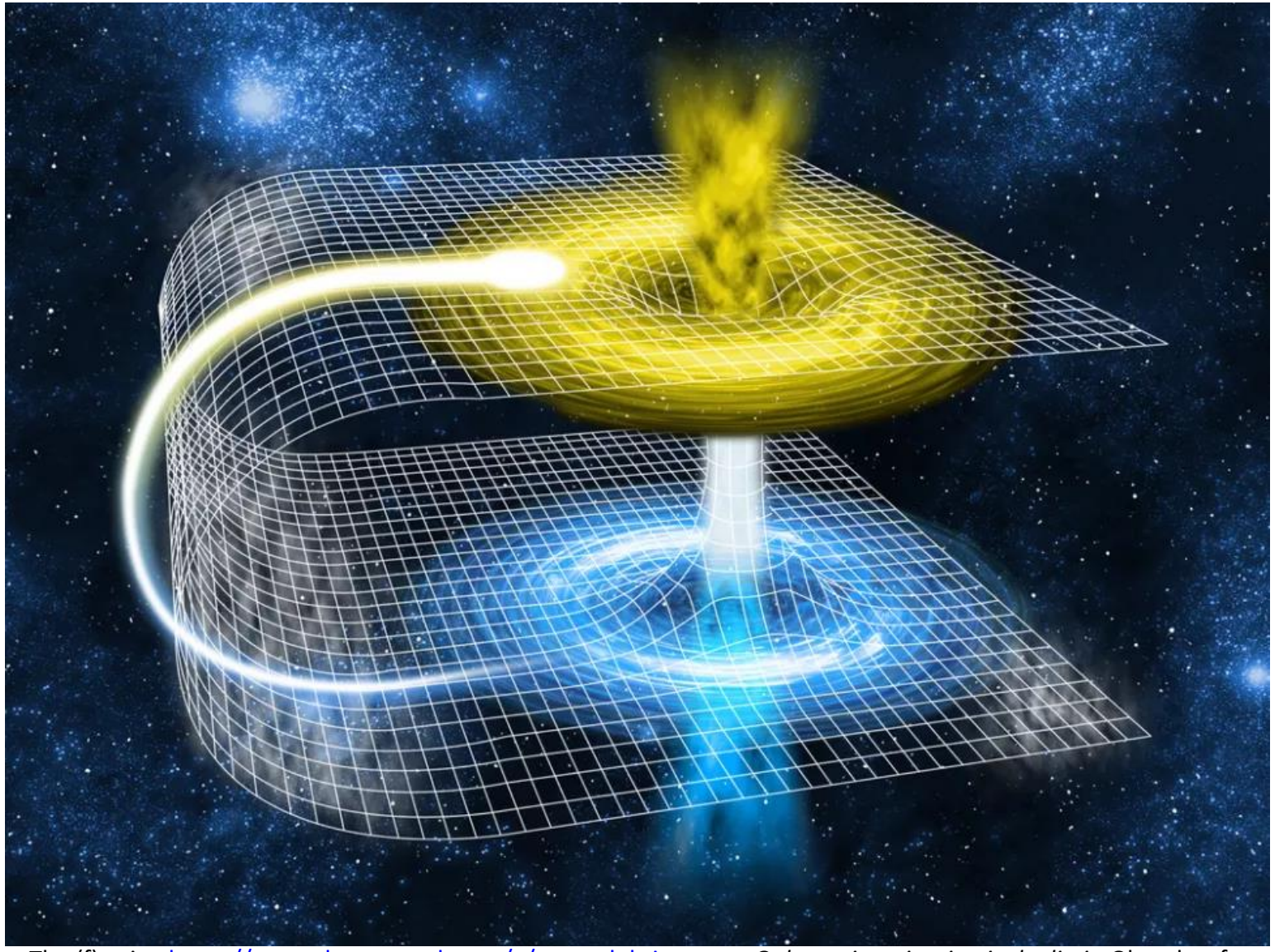
He also wrote:

Autoritätsdusel ist der größte Feind der Wahrheit.

Clinging giddily to authority is the greatest enemy of truth.

Zich duizelig vastklampen aan autoriteit is de grootste vijand van de waarheid.

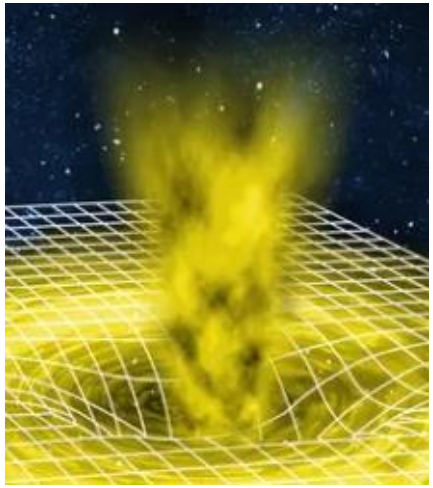
Beautyful image, but physical nonsense:



Shouldn't it be a *paraboloid* (given $u^2 = r - 2m$)?

Stars outside the cosmos?

180° curvature?



Farting?

The (f)artist: https://www.shutterstock.com/g/eugendobric states: *Only our imagination is the limit*. Okay, but for a physicist, truth should be the limit.