

## Imagining the Universe

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**Abstract:** *The gravitational interaction can be expressed as a screening effect of electromagnetic interaction.*

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The observable Universe can be expressed as a screened “bubble”.<sup>‡</sup> The potential electric energy of each charge is (smoothly) cut at the characteristic size (“of Universe”)  $R_Z$ , corresponding to the conductivity (or capacitance) parameter of matter (with a given density). The characteristic atomic size  $R_A$  (of the separation of opposite charges inside the “neutral” matter) defines the strength ratio of the electromagnetic interaction to the gravitation interaction (the large numbers hypothesis). This cut off then corresponds to the gravitation energy.

All particles are attracted to the observable horizon (the “bubble” has no position preference as well as the Universe “expansion”) due to this screening (that creates mirrored image of our reality). The total energy from electromagnetic interaction is

$$E = \frac{1}{2} \sum_{i,j} B_{ij} Q_i Q_j \quad \text{where } B_{ij} = \frac{1}{4\pi\epsilon} \frac{1}{|r_i - r_j|} \text{ for point charges}$$

and it can also be understood as a capacitance between conductors

$$E = \frac{1}{2} \sum_{i,j} C_{ij} \varphi_i \varphi_j$$

and the effect of a conductive sphere of diameter  $R_Z$  when

$$C = 4\pi\epsilon \frac{R_Z R_A}{R_Z - R_A} \cong 4\pi\epsilon R_A \left(1 + \frac{R_A}{R_Z}\right)$$

We can calculate potential of charge displaced by distance  $D$  from its screening equilibrium. It will be modified by (“red shift”) factor approximately

$$\varphi \cong \varphi_0 \left(1 + \frac{D}{R_Z}\right).$$

The potential (of charge pairs present inside the neutral matter) will be

$$\varphi \cong \frac{Q}{4\pi\epsilon} \frac{R_A}{D^2} \left(1 + \frac{D}{R_Z}\right) = \varphi_0 + \frac{Q}{4\pi\epsilon} \frac{R_A}{R_Z} \frac{1}{D}$$

where the modification corresponds to gravity.

The expansion is (exactly) compensated by (“gravitational”) attraction (for the conservation reasons - the critical density also defines screening/gravitational parameters and conversely the screening defines observability). The attraction between neutral bodies can be explained as its additional potential energy that comes from modification (stretching) of equilibrium position of opposite charges inside this body. The (gravity) equilibrium takes many years

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<sup>‡</sup> This distant screening (image) charge is the antimatter (“hologram”). Its non-stationary leaking (a small fraction) “produces” temporary antimatter in local experiments.

(“the age the Universe” is comparable to the lifetime of the gravitationally bounded objects such as galaxies and stars). However the retardation effect can be fast transferred (and mirrored) by equilibrium development of nearby bodies (only a difference from the local quasi-equilibrium is observed/measured, however some “relativistic” “violations” and anisotropies can be observed).

The screening non-isotropy (also observable in CMB multipoles) leads to different angular momenta (effective Planck constants) and corresponding magnetic momenta (and interpretatively rest masses) of particles.

This model also explains why the speed of gravity is the same to the speed of light and why the gravitational interaction should be described as electromagnetic field [1] and not as the metric [2].

[1] P. Křen: Correction due to the finite speed of gravity in absolute gravimeters, 2013, <http://gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/5134>

[2] P. Křen: The Source, the Field or the Metric? (Part II), 2009, <http://gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/1253>