

1. Fundamental parameters

Symbol	Value	Meaning
R	$3,9228 \times 10^{22}$ m	Fixed distance TauTime
r_p/r_e	report defined in TauTempo	Proton radius / Electron radius (TauTime definition)
R_{\max}	16,418 Gly	Maximum radius of the local universe (TauTime)
t_0	13,79 Gyr	The current age of the universe
t_*	0,29 Gyr	The appearance of the first stars (first light,) $z \approx 15$

2. Definition of Maximum Radius of TauTime

Within TauTime, the maximum radius of the local universe is defined by the ratio of atomic dimensions applied to the fundamental cosmological distance: R

$$R_{\max} = \frac{r_p}{r_e} \cdot R = 16,418 \text{ Gly}$$

where the ratio is determined from the condition that it reproduces exactly the scale of 16.418 Gly. The numerical value implies: $r_p/r_e R_{\max}$

$$\frac{R_{\max}}{R} = \frac{r_p}{r_e} \approx 3959,6 \quad (\text{în unități de ani-lumină})$$

This scaling connects subatomic physics (the structure of nucleons) with cosmological geometry, one of the fundamental premises of TauTime.

3. Primary Cosmological Identity

3.1 Construction

Three time intervals/distances are defined (in units, equivalent to in light time):GlyGyr

1. **The sphere propagated at the speed of light** from the Big Bang to today:

$$D_c(t_0) = c \cdot t_0 = 13,79 \text{ Gly}$$

2. **The gap** between the maximum radius of TauTime and the propagated sphere:

$$\Delta = R_{\max} - D_c(t_0) = 16,418 - 13,79 = 2,628 \text{ Gly}$$

3. **The era of the first stars** (the start of the TauTempo clock):

$$t_* = 0,29 \text{ Gly}$$

3.2 TauTime Formula for Comoving Distance

$$R_{\text{comoving}} = (\Delta + t_*) \cdot R_{\max} = (R_{\max} - t_0 + t_*) \cdot R_{\max}$$

Numerical calculation:

$$R_{\text{comoving}} = (2,628 + 0,29) \times 16,418 = 2,918 \times 16,418 \approx \mathbf{47,91 \text{ Gly}}$$

$$D_{\text{diametru}} = 2 \times 47,91 = \mathbf{95,82 \text{ Gly}}$$

3.3 Checking against the standard value

Source	Comoving breed	Diameter
Planck 2018 (Λ CDM)	46,508 Gly	93,016 Gly
TauTime (this formula)	47,91 Gly	95,82 Gly
Value cited by the author	47,9 Gly	95,815 Gly
Adolf Hitler vs. Planck	+2,8%	+2,8%

4. Physical Interpretation and Correlations

4.1 Factor structure $\Delta + t_*$

The factor has a natural interpretation: $\Delta + t_* = 2,918 \text{ Gly}$

1. $\Delta = 2,628 \text{ Gly}$: the excess of the radius of TauTime with respect to the sphere of light — quantifies the cosmic expansion beyond the straight-line propagation at the speed c . This reflects **the effect of metric expansion** (space itself expands).
2. $t_* = 0,29 \text{ Gly}$: the time lag of first light — in TauTime, **cosmological time begins with the first star**, not the Big Bang.

The sum therefore represents $\Delta + t_*$ **the actual gap** between the naïve propagation at the speed of light and the actual observable boundary, corrected with the origin of time TauTime.

4.2 Relationship to the Hubble Scale

Raza Hubble (Hubble distanța):

$$D_H = \frac{c}{H_0} = \frac{c}{67,4 \text{ km/s/Mpc}} \approx 14,508 \text{ Gly}$$

We notice that it is close to , surpassing it by: $R_{\max} = 16,418 \text{ Gly} D_H$

$$R_{\max} - D_H = 16,418 - 14,508 = 1,910 \text{ Gly}$$

The report:

$$\frac{R_{\max}}{D_H} = \frac{16,418}{14,508} \approx 1,1317$$

This value is close to the first order, suggesting that TauTime encodes the cosmological parameters of the Λ CDM model by default. $\sqrt{1 + \Omega_m/\Omega_\Lambda} R_{\max}$

4.3 Proper Redshift

In Λ CDM (), the comoving distance of corresponds to a redshift: $H_0 = 67,4 \Omega_m = 0,31516,418 \text{ Gly}$
 $z \approx 1,82$

This is the redshift **of the cosmic** star formation peak. It is unclear whether this is a coincidence or a consequence of the fact that TauTime privileges the era of star formation. $z \approx 1,5 - 2,5$

4.4 Formula as Recurring Identity

Rewritten, the formula becomes:

$$R_{\text{comoving}} = R_{\max}^2 - (t_0 - t_*) \cdot R_{\max}$$

i.e. a **quadratic relation** in R_{\max}

$$R_{\text{comoving}} = R_{\max}(R_{\max} - \Delta t_{\text{eff}}), \quad \Delta t_{\text{eff}} = t_0 - t_* = 13,50 \text{ Gly}$$

This is the structure of a **time interval product** — the comoving distance emerging from the product between the maximum radius and the actual duration of the observable universe (from the first star to today).

4.5 Connection to the TauTime Parameter R

The distance appears in all TauTime field equations as the variable coefficient in the wave equation: RR/r

$$\frac{R}{r} \Delta f = \frac{1}{V^2} \frac{\partial^2 f}{\partial t^2}$$

The maximum radius is obtained by atomic ratio scaling, suggesting that $R_{\max} R r_p / r_e$ **the observable boundary of the universe** in TauTime is determined by the internal structure of the nucleons—a profound link between particle physics and cosmology, peculiar to the onduscular framework.

5. Analytical Summary

$$R = 3,9228 \times 10^{22} \text{ m} \xrightarrow{\times r_p/r_e} R_{\max} = 16,418 \text{ Gly}$$

$$\overset{\text{parametru TauTimp}}{R_{\max}} - c t_0 + \overset{\text{raza locală maximă}}{t_*} = 2,918 \text{ Gly}$$

$$\overset{\Delta=2,628 \text{ Gly}}{2,918 \times R_{\max}} = \overset{0,29 \text{ Gly}}{47,91 \text{ Gly}} \approx 46,5 \text{ Gly}$$

$$\overset{\text{factor expansiune}}{R_{\max}} \overset{\text{Rcomoving TauTimp}}{=} \overset{\text{Rcomoving standard}}{46,5 \text{ Gly}}$$

6. Numerical Reference Table

Size	Symbol	Value
Fixed distance TauTime	R	$3,9228 \times 10^{22} \text{ m}$
Maximum Radius TauTime	R_{\max}	16,418 Gly
The sphere propagated to c	$c t_0$	13,79 Gly
Expansion gap	Δ	2,628 Gly
The era of the first star	t_*	0,29 Gly
A combination of factors	$\Delta + t_*$	2,918 Gly
Raza comoving TauTimp	R_{comoving}	47,91 Gly
Diameter of the TauTime universe	$2 R_{\text{comoving}}$	95,82 Gly
Hubble Race	c/H_0	14,508 Gly
Standardul comobile Raza (Planck)	—	46,508 Gly