

Kelvin's Calculation Was Never Refuted; What Was Replaced Was the Reservoir

— From one and the same solar luminosity, gravitational contraction gives 9.4248×10^6 years and fusion 1.0358×10^{10} — against the Earth's radiometric age of 4.54×10^9 years the first is **481.71** times too short and the second **2.28** times too long — the two mechanisms differ by **1099.05**, and the division itself is correct in both — [Paper 497]

Yuuki YAMAGISHI (山岸 勇輝)
Yamagishi Complexity Torus Lab, Japan
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— *From thinking to syncing.* —

Abstract

Kelvin's age of the Sun is taken to have failed because the calculation was wrong. This paper shows that both divisions are correct and only the estimate of the reservoir differs—one luminosity yielding two ages a factor of **1099.05** apart. No new theorem or law is claimed. First, the gravitational-contraction age is 9.4248×10^6 years (Section 2). Second, the fusion age is 1.0358×10^{10} years (Section 2). Third, this is the core of the paper. The two differ by **1099.05**, and the age of the Earth lies between them (Section 3). Fourth, gravitational contraction is **481.71** times shorter than the Earth's age—a discrepancy of more than two orders (Section 3). Fifth, fusion is longer than the Earth's age—on the other side of the boundary (Section 3). Sixth, the separator is whether the division failed or the numerator did (Section 4). **Keywords:** Kelvin-Helmholtz timescale, age of the Sun, nuclear fusion, gravitational contraction, age of the Earth.

Scope of this paper (scope note): No new theorem or law is claimed—the Kelvin-Helmholtz timescale and the fusion lifetime estimate are both standard. Stellar structure is not solved—the origin of the luminosity, convection, the details of nucleosynthesis and departure from the main sequence are not the subject; two reservoirs are divided by one luminosity. History is not adjudicated—what Kelvin knew, and how the controversy proceeded, are left to the historians. The coefficients are not refined—the $3/10$ of the gravitational energy and the 0.1 burnable fraction are both coarse, present to show orders of magnitude. The Earth's age is not derived—the radiometric value is used as known, and its measurement is not entered. Relation to earlier papers: Paper 481 showed that a refutation can be blamed on any assumption of a conjunction—this is its textbook instance. Paper 485 showed that Michell's radius was right for a different reason—there, a right answer from a wrong reason; here, a right procedure from a wrong premise. Paper 483 showed that L/M is a combination of constants—this paper too divides a reservoir by a luminosity. Paper 300 showed that a shared root can be decided—the two ages are distinct roots. What is added is giving the contraction age as 9.4248×10^6 years, giving the fusion age as 1.0358×10^{10} years, giving the ratio to the Earth's age as 481.71, giving the ratio between mechanisms as 1099.05, and showing that the two bracket the Earth's age.

1. Notation and the Question

Setting: If the Sun shines at a constant luminosity L from a usable reservoir E , its age is E/L . Take two reservoirs.

$$E_{\text{grav}} = \frac{3}{10} \frac{GM^2}{R}, \quad E_{\text{nuc}} = 0.007 \times 0.1 \times Mc^2$$

The first is the gravitational energy released as a uniform sphere contracts; the second is what is released when a tenth of the mass burns hydrogen at an efficiency of 0.7 per cent. Both are divided by the same $L = 3.828 \times 10^{26}$ W.

Observation 1.1

Kelvin's age of the Sun is taken to have failed because the calculation was wrong. The number came out too small—so an arithmetic slip must be somewhere, runs the picture.

Observation 1.2

But the division is a single line. A reservoir over a luminosity—there is nothing in it to get wrong.

Question: How far apart are the two ages that one luminosity yields.

2. One Luminosity Yields Two Ages

Computation 2.1: Divide both reservoirs by the same luminosity.

Reservoir	Age
Gravitational contraction (Kelvin-Helmholtz)	9.4248×10^6 years
Fusion	1.0358×10^{10} years

Observation 2.2

Contraction gives 10^7 years. 9.4248×10^6 years—the order Kelvin obtained in the nineteenth century.

Observation 2.3

Fusion gives 10^{10} years. 1.0358×10^{10} years—the order of the solar lifetime accepted today.

Observation 2.4

The luminosity used was the same. 3.828×10^{26} W—the denominator did not change; only the numerator did.

Observation 2.5

Both divisions are correct.A single line of arithmetic—neither one made an arithmetic error.

3. The Earth’s Age Lies Between Them

Computation 3.1: Compare with the Earth’s radiometric age of 4.54×10^9 years.

Quantity	Value	Verdict
Gravitational contraction	9.4248×10^6 years	too short
Age of the Earth	4.5400×10^9 years	the reference
Fusion	1.0358×10^{10} years	sufficient

Observation 3.2

Contraction is 481.71 times shorter than the Earth’s age. More than two orders—not explicable by measurement error.

Observation 3.3

Fusion is longer than the Earth’s age. 1.0358×10^{10} against 4.5400×10^9 —the other side of the boundary: the two bracket it.

Observation 3.4

The two mechanisms differ by 1099.05. Three orders—the estimate of the reservoir fixes the order of the answer entirely.

Observation 3.5

So the Earth’s age is a test that selects a reservoir. Only one passes—measuring the luminosity cannot select, but an independent date can.

4. The Separator

The separator: did the division fail, or the numerator.

Observation 4.1

The division, and the repair is arithmetic. E/L —a single line, and there is no error in it.

Observation 4.2

The numerator, and the repair is physics. What the reservoir is—and this is what was actually replaced, gravity giving way to the nucleus.

Observation 4.3

The two are distinct roots by the criterion of Paper 300. Both are “the age of the Sun”—one the lifetime of a gravitational reservoir, one of a nuclear one: they name different things.

Observation 4.4

This is the textbook instance of Paper 481. “The age of the Sun disagrees with geology” as a refutation—it could be blamed on the measured luminosity, on spherical symmetry, on constancy of the luminosity, or on gravity being the reservoir. It fell on the last.

Observation 4.5

And what fixed where it fell was a number from outside: the radiometric date. In the language of Paper 481, one separator was added—until then, logic could not choose which assumption to doubt.

Observation 4.6

Paper 485 runs the other way. There, a right answer from a wrong reason—here, a right procedure from a wrong premise, with only the answer failing.

Observation 4.7

To be honest—both coefficients are coarse. The $3/10$ is the uniform-sphere value and the 0.1 a rough burnable fraction—the real Sun is centrally condensed and burns in a limited region. What is claimed here is the order and the ratio, not the values themselves.

5. Roll Call and Closing

1. 9.4248×10^6 years by contraction (Computation 2.1): order 10^7 .
2. 1.0358×10^{10} years by fusion (Computation 2.1): order 10^{10} .
3. The same 3.828×10^{26} W (Observation 2.4): only the numerator changed.
4. Both divisions correct (Observation 2.5): no arithmetic error.
5. 481.71 times short of the Earth (Observation 3.2): more than two orders.
6. Fusion outlasts the Earth (Observation 3.3): the other side.
7. 1099.05 between mechanisms (Observation 3.4): the core.
8. The Earth's age is the test (Observation 3.5): only one passes.
9. The separator is division or numerator (Observation 4.3): the instance of Paper 481.
10. Coarse coefficients (Observation 4.7): orders and ratios only.

Closing: Kelvin's age of the Sun is taken to have failed because the calculation was wrong—the number came out too small, so an arithmetic slip must be somewhere. But the division is a single line, a reservoir over a luminosity, with nothing in it to get wrong. One luminosity yields two ages—dividing the gravitational reservoir $\frac{3}{10} GM^2/R$ gives 9.4248×10^6 years and the nuclear reservoir $0.007 \times 0.1 \times Mc^2$ gives 1.0358×10^{10} . The first is the order Kelvin obtained in the nineteenth century, the second the order of the solar lifetime accepted today. The luminosity used was the same 3.828×10^{26} W in both: the denominator did not change, only the numerator. Both divisions are correct, and neither one made an arithmetic error. The Earth's age lies between them—against the Earth's radiometric 4.5400×10^9 years, contraction is 481.71 times shorter, a discrepancy of more than two orders that measurement error cannot explain. Fusion at 1.0358×10^{10} years is longer, on the other side of the boundary, so the two bracket the Earth's age. The two mechanisms differ by 1099.05, three orders, and the estimate of the reservoir fixes the order of the answer entirely. So the Earth's age is a test that selects a reservoir: measuring the luminosity cannot select, but an independent date can. One thing separates them—did the division fail, or the numerator. The division, and the repair is arithmetic—but E/L is a single line with no error in it. The numerator, and the repair is physics—and this is what was actually replaced, gravity giving way to the nucleus. The two are distinct roots by the criterion of Paper 300: both are “the age of the Sun”, but one is the lifetime of a gravitational reservoir and one of a

nuclear one. This is the textbook instance of Paper 481: “the age of the Sun disagrees with geology” could be blamed on the measured luminosity, on spherical symmetry, on constancy of the luminosity, or on gravity being the reservoir, and it fell on the last. What fixed where it fell was a number from outside, the radiometric date; in the language of Paper 481 one separator was added, and until then logic could not choose which assumption to doubt. Paper 485 runs the other way: there a right answer from a wrong reason, here a right procedure from a wrong premise, with only the answer failing. To be honest—both coefficients are coarse. The $3/10$ is the uniform-sphere value and the 0.1 a rough burnable fraction, while the real Sun is centrally condensed and burns in a limited region. What is claimed here is the order and the ratio, not the values themselves.

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Yuuki YAMAGISHI (山岸 勇輝)

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