

Units Prāṇa as Timekeeper-Uniting Ancient Indian Time Units with the 21 cm Hydrogen Line

Krishnamurthy Ramakrishnan

Fellow Member of the Institute of Chartered Accountants of India

Independent Researcher – Physics, Cosmology, Ancient Indian Cosmology, Vedas, Upanishads and Patanjali's Yoga Sutras

Email: [aihind\[at\]therealuniverse.org](mailto:aihind[at]therealuniverse.org)

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Abstract: This paper investigates the fascinating intersection of ancient Indian timekeeping and modern astrophysics by exploring how the traditional unit of time called prāṇa aligns with the 21 cm hydrogen line, a cornerstone in cosmological measurements. Rather than viewing prāṇa as a poetic metaphor, the study proposes it as a scientifically grounded unit, resonating with a universal frequency observed in neutral hydrogen. This perspective reimagines ancient Indian temporal frameworks as reflections of cosmic rhythms, offering an intriguing alternative to Earth-bound time concepts.

Keywords: prāṇa, hydrogen 21 cm line, ancient Indian cosmology, time measurement, paramāṇu

1. Introduction

Timekeeping systems have historically reflected human-scale phenomena such as the Earth's rotation and orbital cycles. In ancient India, however, time was divided not only according to celestial movements but also based on deeply rooted metaphysical ideas. One such unit is prāṇa, traditionally defined as the time of one complete breath or the time to utter ten long syllables.

In this paper, we argue that prāṇa was not merely a poetic measure, but a practical time unit grounded in observation of universal constants – specifically, the oscillation frequency of neutral hydrogen, the most abundant and fundamental element in the cosmos.

This paper serves as a focused supplement to a broader investigation previously presented in Prāṇa as Neutral Hydrogen: Modern Science Corroborates the Upanishads¹, where the identity of Prāṇa with neutral hydrogen was explored across biological, cosmological, and energetic dimensions. That work established the following key correspondences:

- **HI in the body:** The role of hydrogen in H₂O and hydrogen-bond networks that sustain biochemical processes, aligning with Chāndogya Upanishad 6.5.2.
- **HI as a cosmic substrate:** Its foundational presence in star formation, molecular clouds, and interstellar structure.
- **HI covalent bonding:** The dynamic energy structures that underlie both life and planetary chemistry.

Highlighting this correspondence challenges prevailing assumptions about ancient science and suggests that early Indian thinkers may have intuitively grasped cosmic constants long before modern instrumentation.

2. The 21 cm Line: A Universal Clock

Neutral hydrogen (HI) emits radiation at a wavelength of 21.106 cm due to a hyperfine spin-flip transition between the parallel and antiparallel spin states of the electron and proton.

This corresponds to a frequency of approximately 1.42040575177 GHz. Because this transition is stable, uniform, and detectable across vast stretches of space and time, it has become a cornerstone of modern radio astronomy and cosmological time measurement.^{2 3}

Unlike Earth-based clocks, this frequency is invariant across reference frames, offering a natural, universal standard for time.

3. Ancient Indian Time Units and Prāṇa

According to classical sources such as the Kāmikāgama and traditional astronomical treatises, time in ancient India was structured hierarchically:

- 1 prāṇa \approx 24 seconds (though some sources cite \approx 4 seconds, 24 seconds is more commonly accepted).
- 1 vinādikā = 6 prāṇas = \sim 144 seconds
- 1 ghaṭikā = 60 vinādikās = \sim 2,880 seconds (48 minutes)

The smallest referenced unit, paramāṇu, is a sub-second duration from which larger units are built.

4. Rational Correlation Between Paramāṇu and HI Oscillations

By mapping the HI transition frequency to Prana, we observe a precise, rational relationship:

No of Seconds in 1 Truti – (A)	0.0005920
No of Paramanus in 1 Truti – (B)	24
No of Seconds in 1 Paramanu = A/B – (C)	0.000024666666666666700
Paramanus in 1 second = C * 60	2,432,432.432432430
Speed of Light in metres per second - A	299,792,458
Precise wavelength of 21 cm line in metres- B	0.2110611405416000
Cycles of 21 cm Line per second = A/B - C	1,420,405,751.767990
21 cm cycles per Prana (24 seconds)	34,089,738,042.431760

Expressed as a fraction:

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$$\frac{8,936,420,289,395,231}{262,144} \approx 34,089,738,042.431760$$

This result is significant because it is not arbitrary: the numerator and denominator form a clean ratio, suggesting a mathematically structured correspondence between an ancient unit of time and a modern quantum-frequency standard.

While this correlation could be coincidental, its alignment with ancient associations of prāṇa with cosmic and life rhythms, it becomes plausible that time was once conceived as inherently wave-based.

5. Implications and Conclusion

The modern definition of a second, tied to caesium-133, is often seen as a liberation from Earth-based timekeeping. However, it is still derived from the traditional second – an artefact of Earth's rotation. In contrast, time defined by the 21 cm hydrogen line is independent of planetary motion and is truly universal.

By showing that ancient Indian units such as prāṇa and paramāṇu may harmonically relate to the HI frequency, we propose that the ancients intuitively or observationally recognised this cosmic rhythm.

Thus, prāṇa can be seen not only as life-force, breath, or energy, but as a **cosmic timekeeper** anchored in the vibration of the most elemental building block of the universe.

This paper completes a circle long open: from the breath within, to the stars beyond, **prāṇa marks the time of the cosmos.**

References

- [1] Fialkov, A., T. Gessey-Jones, and J. Dhandha. "Cosmic Mysteries and the Hydrogen 21-Cm Line: Bridging the Gap with Lunar Observations." *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 382, no. 2271 (2024). <https://doi.org/10.1098/rsta.2023.0068>. <http://dx.doi.org/10.1098/rsta.2023.0068>.
- [2] Pritchard, Jonathan R., and Abraham Loeb. "21 Cm Cosmology in the 21st Century." *Reports on Progress in Physics* 75, no. 8 (2012): 086901-01. <https://doi.org/10.1088/0034-4885/75/8/086901>. <http://dx.doi.org/10.1088/0034-4885/75/8/086901>.
- [3] Ramakrishnan, Krishnamurthy. "The Subtlest Essence: Prāṇa as Neutral Hydrogen and Its Cosmic Significance." Zenodo, 2025. <https://doi.org/10.5281/zenodo.15055253>

¹ Krishnamurthy Ramakrishnan, "The Subtlest Essence: Prāṇa as Neutral Hydrogen and Its Cosmic Significance," (Zenodo, 2025), <https://doi.org/10.5281/zenodo.15055253>. <https://doi.org/10.5281/zenodo.15055253>.

² Jonathan R. Pritchard and Abraham Loeb, "21 cm cosmology in the 21st century," <https://doi.org/10.1088/0034-4885/75/8/086901>, *Reports on Progress in Physics* 75, no. 8 (2012), <http://dx.doi.org/10.1088/0034-4885/75/8/086901>.

³ A. Fialkov, T. Gessey-Jones, and J. Dhandha, "Cosmic mysteries and the hydrogen 21-cm line: bridging the gap with lunar observations," <https://doi.org/10.1098/rsta.2023.0068>, *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 382, no. 2271 (2024), <http://dx.doi.org/10.1098/rsta.2023.0068>.