# From the Universe to the Planck Length

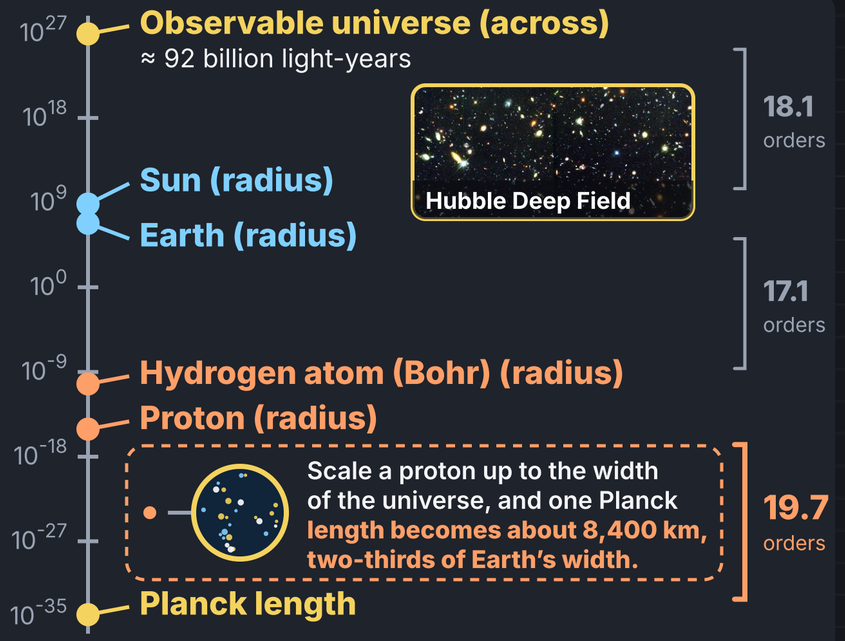
One length built from three constants of nature, and how far down it sits.

## THE RECIPE

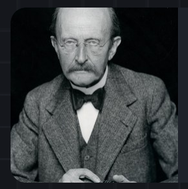
$$l_P = \sqrt{\frac{\hbar G}{c^3}}$$

| | | |
|---|---|---|
| $\hbar$ | $1.054\,571\,817\ldots \times 10^{-34}$ J s | exact |
| $G$ | $6.674\,30(15) \times 10^{-11}$ m$^3$ kg$^{-1}$ s$^{-2}$ | |
| $c$ | 299 792 458 m s$^{-1}$ | exact |
| Planck length | **$1.616\,255(18) \times 10^{-35}$ m** | |
| Planck time | **$5.391\,247(60) \times 10^{-44}$ s** | |

## THE LADDER, 63 POWERS OF TEN




## PLANCK'S PAPERS



**Max Planck, 1858–1947**

Photo: Hugo Erfurth, 1938

| | |
|---|---|
| 1899 | Planck proposes "natural units" from his new constant, c and G (18 May) |
| 1900 | Energy law for the black-body spectrum (14 December) |
| 1901 | Annalen der Physik 309: 553–563 |
| 2019 | h fixed exactly: $6.626\,070\,15 \times 10^{-34}$ J s (20 May) |
| 2022 | CODATA 2022: the latest recommended values |

**92** billion light-years across: NASA's figure for the observable universe.

**$5 \times 10^{61}$** Planck lengths would span it, from NASA's figure and CODATA's $l_P$.

**19.7** orders of magnitude between a proton's radius and the Planck length.

**Sources:** CODATA 2022, Mohr, Newell, Taylor, Tiesinga, *Rev. Mod. Phys.* 97, 025002 (2025), NIST · NASA, "How Big is Space?" (2025) · NASA NSSDC Earth and Sun fact sheets · M. Planck, *Sitzungsber. Berlin* 1899:440–480; *Verh. DPG* 2:237 (1900); *Ann. Phys.* 309:553 (1901) · Images: NASA/STScI; H. Erfurth, 1938 (public domain)