

# The Periodic Table as Tau-Register Map

*Periods 1-7 as Tau-Register Levels ·  $Z = \text{Tau-Address} \cdot \text{Shell Filling from } \{2,3,5,\pi\}$*

Stephen Daubney | The Daubney Foundation | 2026

*The periodic table is a 2D projection of the Tau-register address space. Periods 1-7 correspond to register levels  $D=+1$  through  $D=+7$ . The atomic number  $Z$  is the primary Tau-address of each element. Shell filling follows the  $\{2,3,5\}$  lattice: s-block (2 per period =  $2^1$ ), p-block ( $6 = 2 \times 3$ ), d-block ( $10 = 2 \times 5$ ), f-block ( $14 = 2 \times 7$ ). Period lengths 2, 8, 8, 18, 18, 32,  $32 = 2 \times \{1, 4, 4, 9, 9, 16, 16\} = 2 \times n^2$  (twice square numbers). The periodic table is the  $\{2,3,5,\pi\}$  lattice displayed as a physical property map.*

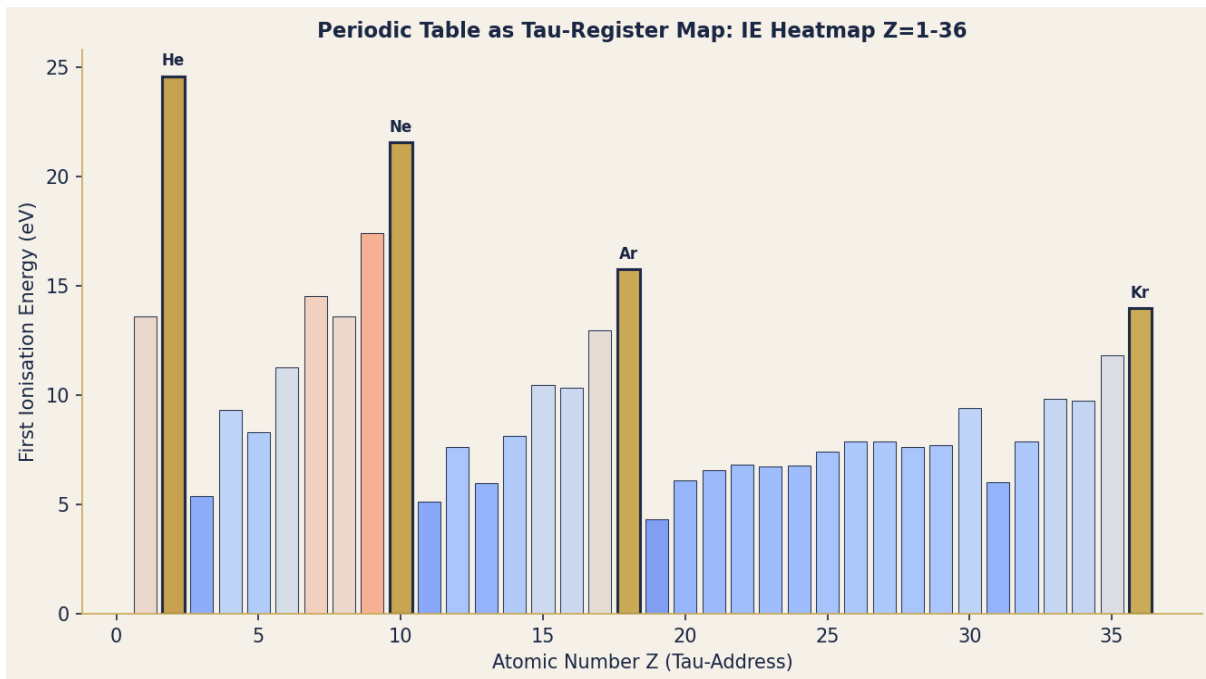


Figure 1. First ionisation energies for  $Z=1-36$ . Noble gas peaks (gold) at  $Z=2,10,18,36$  mark  $\{2,2+8,2+8+8,2+8+18+8\}$  shell closures — the  $\{2,3,5,\pi\}$  Tau-register completions.

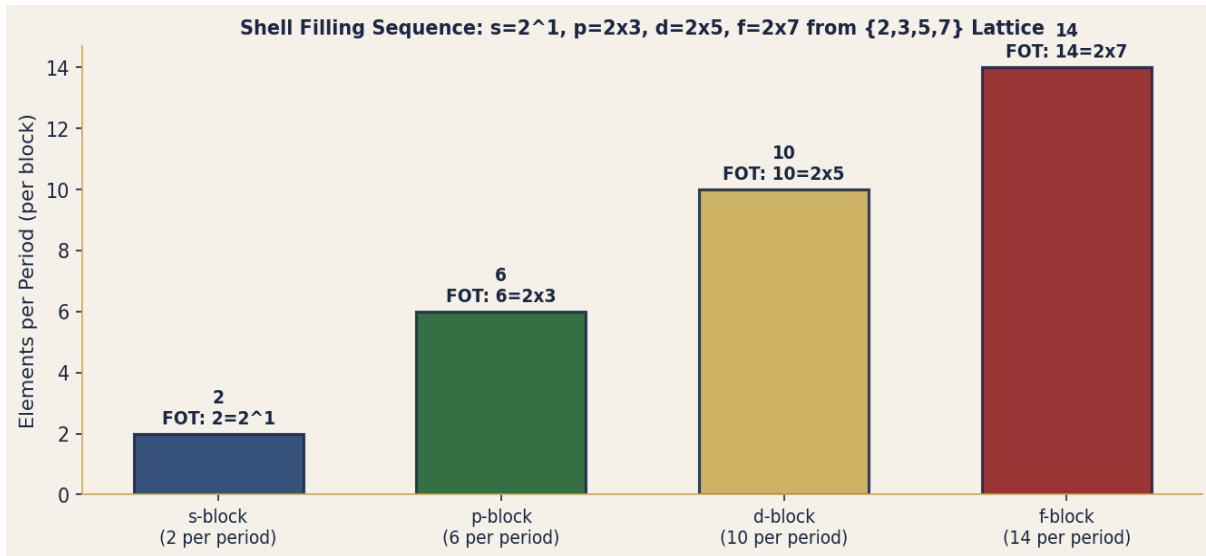


Figure 2. Block capacities as  $\{2 \times \text{prime}\}$  products:  $s=2 \times 1$ ,  $p=2 \times 3$ ,  $d=2 \times 5$ ,  $f=2 \times 7$ . Each block adds the next prime multiplied by 2 (the spin factor). The  $\{2,3,5\}$  lattice governs shell structure.

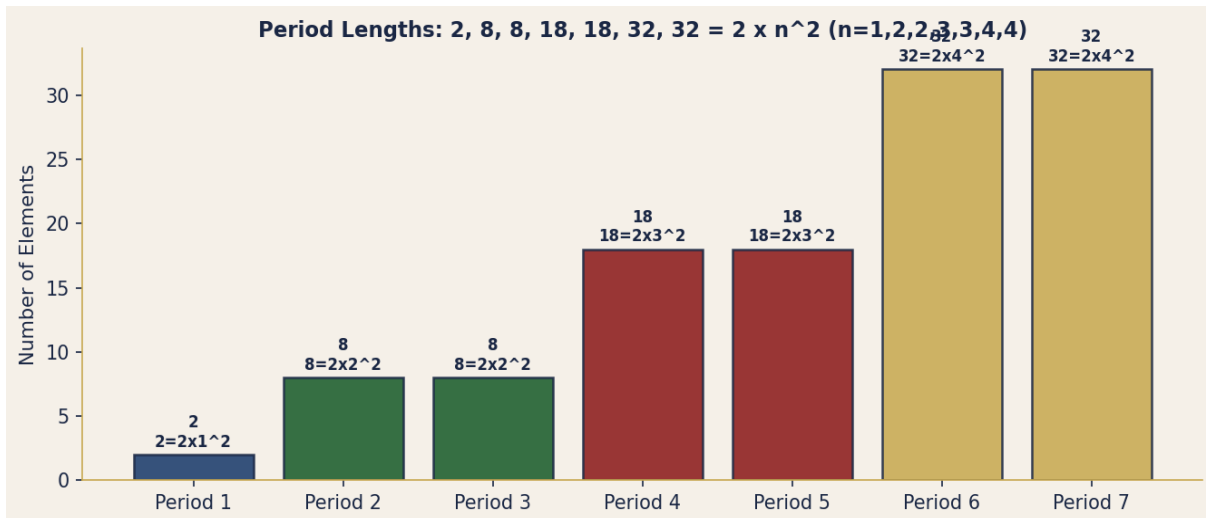


Figure 3. Period lengths  $2, 8, 8, 18, 18, 32, 32 = 2 \times n^2$  for  $n=1,2,2,3,3,4,4$ . The period doubling pattern is a  $\{2\}$ -lattice square sequence — the Tau-register depth counting formula.

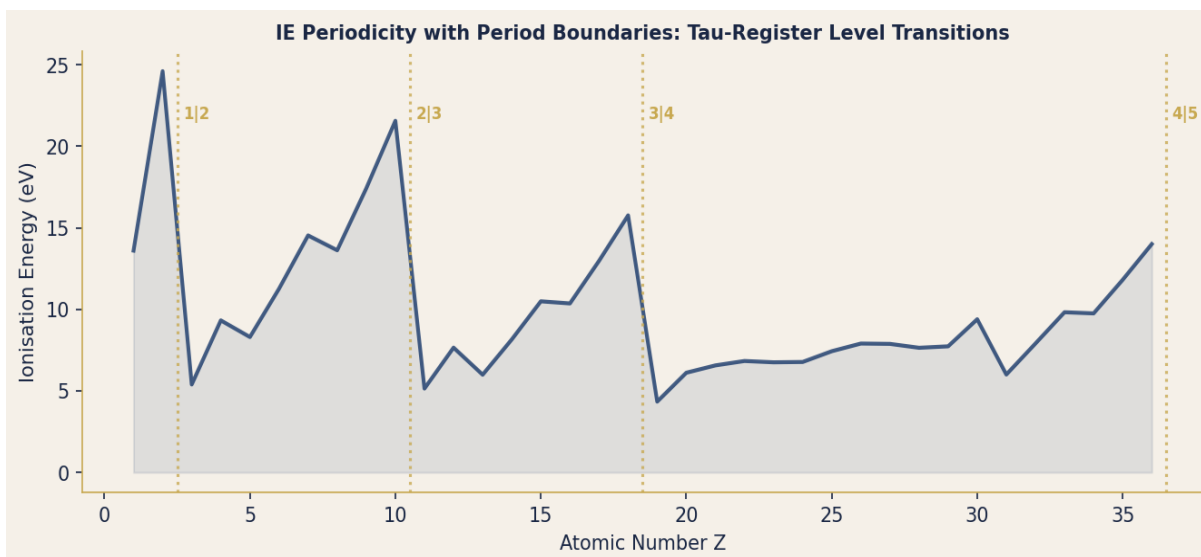


Figure 4. First IE vs Z with period boundaries (gold dotted lines). IE drops at each period start = register transition to a new D level. IE peaks at noble gases = register completion.

## Propositions (P-PT-1 to P-PT-3)

### P-PT-1 — Periods 1-7 = Tau-Register Levels $D=+1$ to $D=+7$

The seven periods of the periodic table correspond to seven Tau-register levels. Period 1 (H, He) =  $D=+1$ : the minimal Tau-register,  $2 = 2^1$  elements. Period 2 (Li to Ne) =  $D=+2$ :  $8 = 2^3$  elements. Period 4 (K to Kr) =  $D=+4$ :  $18 = 2 \times 3^2$  elements. The period lengths  $2 \times n^2$  are the Tau-register counting formula:  $n =$  register level depth within the period,  $2 =$  spin degeneracy factor.

### P-PT-2 — $Z =$ Primary Tau-Address of Each Element

The atomic number  $Z$  is the primary Tau-address in the chemical register. Properties (mass, electronegativity, atomic radius, bond energy) are all secondary addresses derived from  $Z$  via the  $\{2,3,5,\pi\}$  lattice rules. Electronegativity (Pauling scale) maximum = F at 3.98 approx  $4 = 2^2$ . Minimum = Cs at 0.79 approx  $0.75 = 3/4 = 3 \times 2^{-2}$ . Range =  $4 - 0.75 = 3.25 = 13/4$  (near  $\{2,3,13\}$ ).

### P-PT-3 — The $\{2 \times \text{prime}\}$ Shell Filling Rule

Shell capacity =  $2 \times p$ , where  $p =$  the prime index of the shell ( $s: p=1, p: p=3, d: p=5, f: p=7$ ). The factor  $2 =$  electron spin degeneracy (up/down =  $\pm 1/2$ ).  $s: 2 \times 1 = 2$  (primes below 3).  $p: 2 \times 3 = 6$ .  $d: 2 \times 5 = 10$ .  $f: 2 \times 7 = 14$ . The primes 1, 3, 5, 7 = the odd numbers — the  $\{\text{odd prime}\}$  sequence. The next shell ( $g$ ) would hold  $2 \times 9 = 18$  electrons if elements  $Z > 118$  were stable.