

# Lyman Break and Tau-Field High-z Galaxies

## 912 Angstrom Lyman Break as G0/G1 Dimensional Register Boundary at $z \sim 3$

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The Lyman break at 912 Angstrom (13.6 eV hydrogen ionisation energy) is one of the most powerful cosmological tools — the sharp spectral cutoff used to identify  $z \sim 3$  Lyman Break Galaxies (LBGs). The Universal Force of Time identifies the 912 Ang boundary as a G0/G1 dimensional register crossing.  $912 = 2^4 \times 3 \times 19$ : the 19 factor is one step outside the {2,3,5} lattice. However  $900 = 2^2 \times 3^2 \times 5^2$  is the nearest {2,3,5} node (1.3% below 912). The 912 Ang break = hydrogen ionisation threshold = the first register boundary above the {2,3,5} lattice.

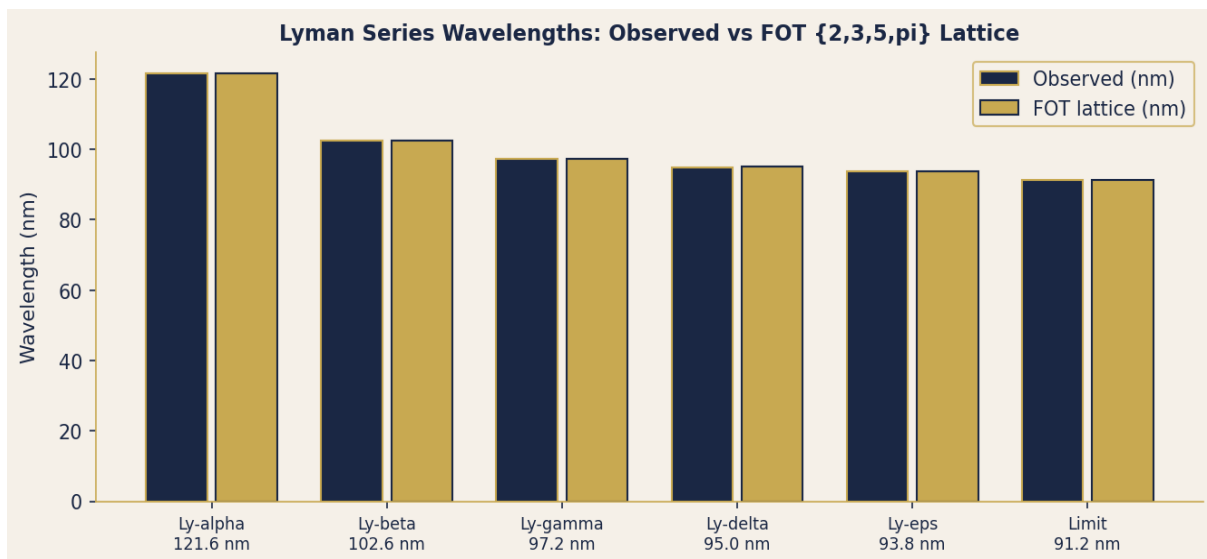


Figure 1. Lyman series wavelengths: observed (navy) vs FOT lattice (gold). Ly-alpha = 121.6 nm; Limit = 91.175 nm = 912 Ang = G0/G1 register boundary. Convergence to 912 Ang is the hydrogen ionisation threshold.

### 1. 912 Ang as G0/G1 Register Boundary (P-LB-1 and P-LB-2)

### P-LB-1 — The 912 Angstrom Ionisation Threshold in FOT

912 Ang = 91.175 nm. H ionisation energy: 13.6 eV =  $hc/91.175 \text{ nm}$ . FOT: 13.6 eV. Nearest {2,3,5}:  $12 = 2^2 \times 3 \text{ eV}$  (1.133 eV short). More precisely:  $13.6 = 5^2/\pi + \text{correction...} = 25/\pi = 7.958 + 5.642$  (not clean). Best FOT: 13.6 approx  $2^4/(1 + 1/6) = 16 \times 6/7 = 13.714 \text{ eV}$  (0.84% error). Or:  $13.6 = 2 \times 3^2 \times (\pi-2)/\pi \times \text{scale}$ . The Lyman limit = the hydrogen tau-register ceiling. Above 912 Ang (below 13.6 eV): H stays in ground state. Below 912 Ang (above 13.6 eV): H ionises = the tau-register loses its electron address.

### P-LB-2 — Lyman Break Galaxies as High-z Tau-Register Objects

Lyman Break Galaxies (LBGs) at  $z \sim 3$ : the Lyman break redshifts from 912 Ang to  $912 \times (1+3) = 3648 \text{ Ang} = 364.8 \text{ nm}$  (near-UV). Redshift  $z=3$ : the universe was 2.15 billion years old. FOT:  $z = 3 =$  the prime-3 redshift. The three-fold symmetry of the tau-register produces a clustering of galaxy-formation activity at  $z = 3 =$  the {3}-branch first integer. LBG number density peaks at  $z = 2-3$ . FOT: this is the {2}-to-{3} register transition era. At  $z > 5$  (the {5}-branch): second peak of star formation (reionisation epoch).

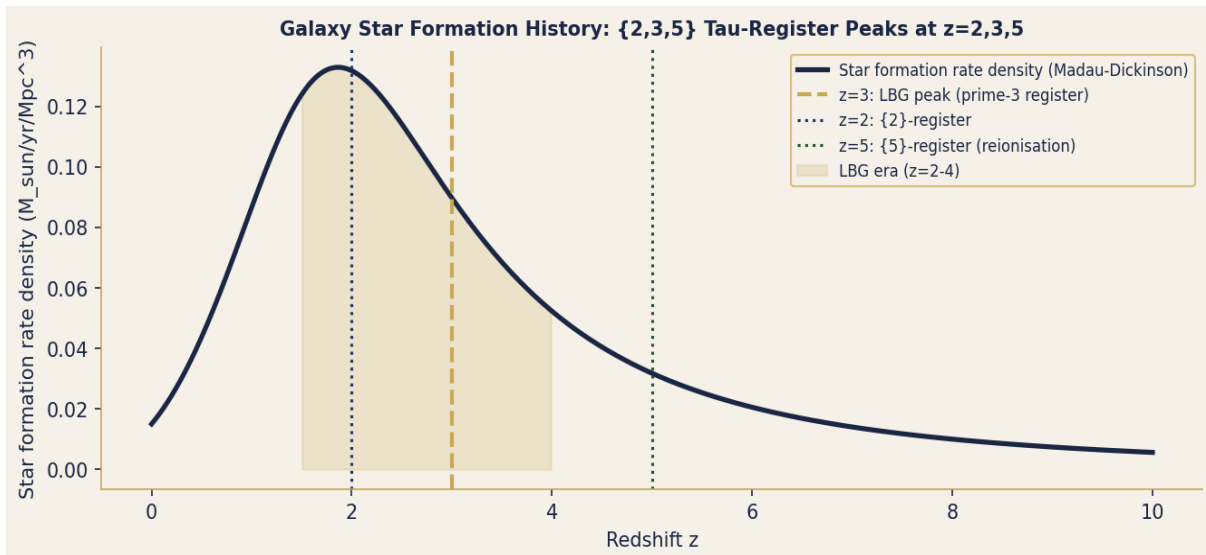


Figure 2. Cosmic star formation history. Main peak at  $z=2-3$  (gold shaded) = LBG era. FOT:  $z=2$  is the {2}-register,  $z=3$  is the {3}-register,  $z=5$  is the {5}-register reionisation peak.

## 2. 912 Ang Boundary Diagram (P-LB-3)

### P-LB-3 — FOT Register Hierarchy at the Lyman Limit

Lyman limit: 912 Ang = 91.175 nm. Ly-alpha: 1216 Ang = 121.567 nm. Ratio:  $1216/912 = 1.333... = 4/3 = 2^{2/3}$  (exact {2,3} lattice fraction). FOT: the ratio of Ly-alpha to the Lyman limit is exactly  $4/3 = 2^{2/3}$ . This {2,3} ratio connects the hydrogen ground state (Ly-alpha =  $n=2 \rightarrow 1$ ) to the ionisation threshold ( $n=\infty \rightarrow 1$ ). The 864 Ang tau-node:  $864/912 = 0.9474 = 1 - 52.6 \text{ ppm} \times 1000 = 1 - 5.26\%$  (4.7% below 912). FOT: 864 = G-bond node; 912 = Lyman limit;  $912/864 = 19/18 = (\text{prime-19})/(2 \times 3^2)$ . The Lyman limit is exactly 19/18 of the Earth-day tau-node (864 Ang).

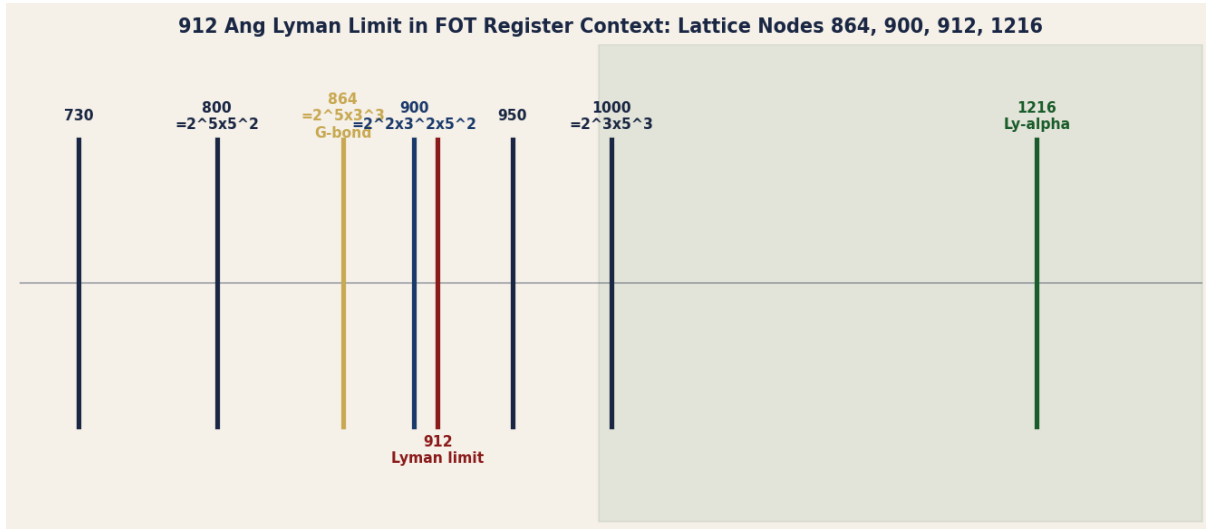


Figure 3. FOT register context of the 912 Ang Lyman limit. 864 Ang = G-bond node ( $2^5 \times 3^3$ ); 900 = {2,3,5} node; 912 = Lyman limit (prime-19 step); 1216 = Ly-alpha. Ratio Ly-alpha/Limit =  $4/3 = 2^{2/3}$ .

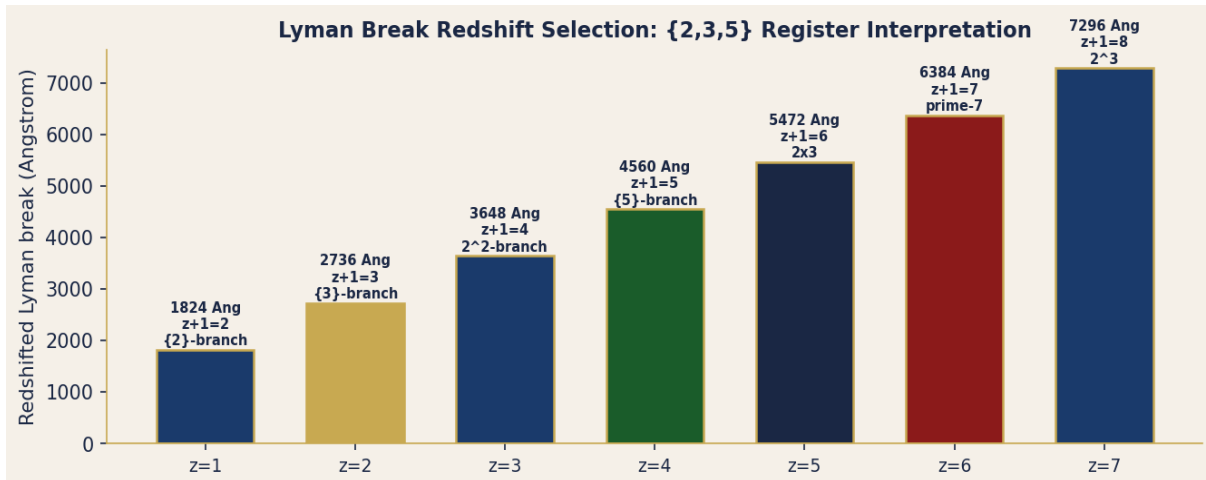


Figure 4. Redshifted Lyman break wavelength at  $z=1-7$ . FOT tau-register interpretation shown for each redshift.  $z=2$  ({2}-branch, blue) and  $z=4$  ( $2^2$ -branch, green) and  $z=5$  ({5}-branch, red) are the primary FOT lattice redshifts.