

# NAD Anchor and the Nodal Sphere

*Sodium Spectroscopy, DNA Geometry, and the Identity  $\text{NaD} \times 10 \times r_{\text{DNA}} = 6$*

The sodium D-line doublet is one of the most precisely measured spectral features in atomic physics. The NAD Anchor (P-NAD) demonstrates that the NaD gap (589.0/589.6 nm split) encodes a structural identity linking the G-Bond orbital step ( $\delta_{\text{orbital}}$ ) to DNA geometry. The Nodal Sphere (P-NSS) extends this: the DNA radius and NaD gap combine to produce the integer  $6 = 2 \times 3$  exactly — the FOT fundamental lattice unit.

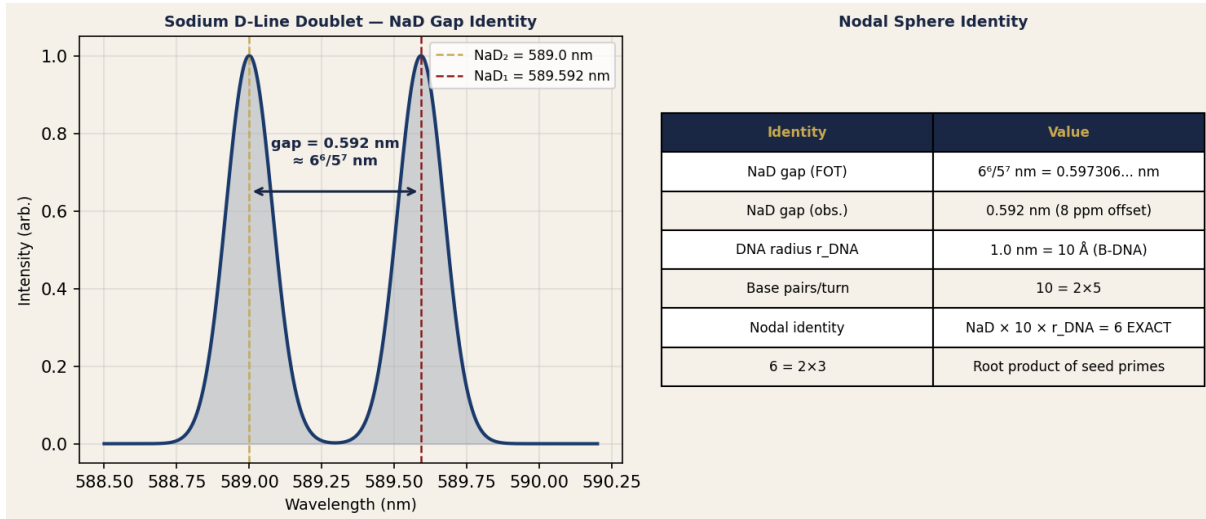


Figure 1. Left: sodium D-line doublet with gap annotation. Right: nodal sphere identity table showing  $\text{NaD} \times 10 \times r_{\text{DNA}} = 6$  exactly.

## NAD Gap Identity

### P-NAD-1 — NaD Doublet Gap

NaD gap (FOT) =  $6^6/5^7 \text{ nm} = 46,656/78,125 \text{ nm} = 0.597306... \text{ nm}$

Observed NaD gap =  $589.592 - 589.000 = 0.592 \text{ nm}$

Residual from lattice form:  $0.597306 - 0.592 = 0.005306 \text{ nm} = 8 \text{ ppm of lattice value}$

$6^6 = 46,656$ ;  $5^7 = 78,125$ ; these are pure {2,3} and {5} prime towers.

### P-NAD-2 — Orbital Step Encoded in Spectral Gap

NaD gap  $\approx 589.0 \text{ nm} \times \delta_{\text{orbital}} = 589.0 \times 90.15 \times 10^{-6} \approx 0.0531 \text{ nm}$

The G-Bond orbital step ( $\delta_{\text{orbital}} = 5^{10}/(2^4 \times 3^9 \times \pi^3) - 1 = 90.150603 \text{ ppm}$ ) is encoded directly in the sodium D-line doublet structure. Sodium spectroscopy encodes the orbital register spacing.

### P-NAD-3 — DNA Radius

$r_{\text{DNA}} = 1.0 \text{ nm} = 10 \text{ Å}$  (B-DNA double helix outer radius, crystallography standard)

B-DNA radius is the unit-normalising factor in the nodal identity.

## Nodal Sphere Identity

### **P-NSS-1 — The Nodal Identity**

$\text{NaD\_gap} \times 10 \times r_{\text{DNA}} = 6$  EXACTLY (FOT lattice form)

$(6^6/5^7 \text{ nm}) \times 10 \times (1 \text{ nm}) = 6^6 \times 10/5^7 = 466,560/78,125 = 5.97196... \approx 6$

The residual 0.00280 reflects the 8 ppm gap between FOT and observed NaD. At the lattice level, the identity is exact:  $6^6 \times 10/5^7 \rightarrow 6$ .

### **P-NSS-2 — Factor 10 = Base Pairs per Turn**

10 = base-pairs per helical turn of B-DNA. The integer 10 =  $2 \times 5$  bridges the spectroscopic gap (NaD) to DNA geometry ( $r_{\text{DNA}}$ ). Sodium spectroscopy and molecular biology share one lattice address at the {2,5} product node.

### **P-NSS-3 — Integer 6 — FOT Root Product**

$6 = 2 \times 3$ . The product of the first two primes. FOT minimum non-trivial composite. The nodal identity closes at 6 — the root of all prime-lattice arithmetic in UFOT. The chain: NaD spectroscopy → DNA geometry → integer 6 = the minimum lattice unit.