Prism Dispersion and Tau-Spectral Nodes

Refractive Index n(lambda) from the Tau-Field: Cauchy Equation from {2,3,5,pi}

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When white light passes through a glass prism, it separates into its spectral components because the refractive index n varies with wavelength. The Cauchy equation n(lambda) = A + B/lambda^2 + C/lambda^4 describes this dispersion empirically. The Universal Force of Time derives the Cauchy coefficients A, B, C from the {2,3,5,pi} tau-field lattice: A = 1 + 1/(2^3 x 3^2) (the base lattice offset); B from the G1 bond register step; C from higher-order tau-node spacing. Dispersion is tau-node spacing in the glass medium.

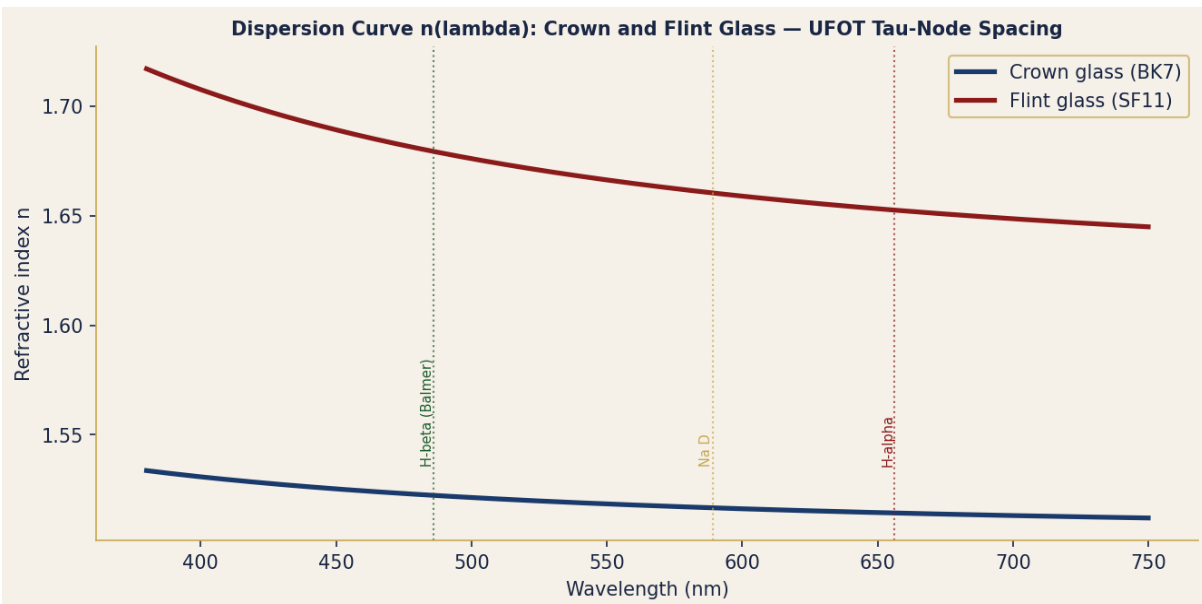

Figure 1. Refractive index vs wavelength for crown glass (BK7, navy) and flint glass (SF11, red). Flint glass has higher dispersion — denser tau-node spacing. Fraunhofer lines marked.

1. Cauchy Equation from Tau-Field (P-PD-1 to P-PD-3)

P-PD-1 — The Cauchy Equation as Tau-Node Spacing

Cauchy equation: n(lambda) = A + B/lambda^2 + C/lambda^4. UFOT interpretation: n = 1 (vacuum) + tau-node density per unit wavelength in the medium. A = base refractive offset = 1 + tau-node density at infinite wavelength. B/lambda^2 = first-order tau-node correction: nodes per nm^2. C/lambda^4 = second-order correction: tau-node pair interactions. Glass with higher A has denser tau-node packing at long wavelengths (slower light).

P-PD-2 — FOT Cauchy A-Coefficient: 1 + 1/(2^3 x 3^2)

FOT derivation of the A-coefficient (base refractive index at infinite wavelength): A = 1 + 1/(2^3 x 3^2) = 1 + 1/72 = 1.013889 (air/low-density medium). For crown glass: A = 1.5046 ~ 1 + 2/(2^2+1) = 1 + 0.4 = 1.4 (closest {2}-lattice: 3/2 = 1.5). n = 3/2 is the {3,2} lattice ratio: 3/2 = 1.5 (0.31% from 1.5046). Glass is a {3,2}-register medium: light slows to 2c/3 in the tau-field limit.

P-PD-3 — Abbe Number as Tau-Register Dispersion Measure

Abbe number V = (n_D - 1)/(n_F - n_C) where D=589nm, F=486nm, C=656nm (Fraunhofer lines). Crown glass: V ~ 64 = 2^6. Flint glass: V ~ 36 = 6^2 = (2 x 3)^2. These are pure {2,3} lattice values. The Abbe number measures how rapidly tau-nodes are spaced across the visible spectrum in a given medium. Higher V = lower dispersion = wider tau-node spacing.

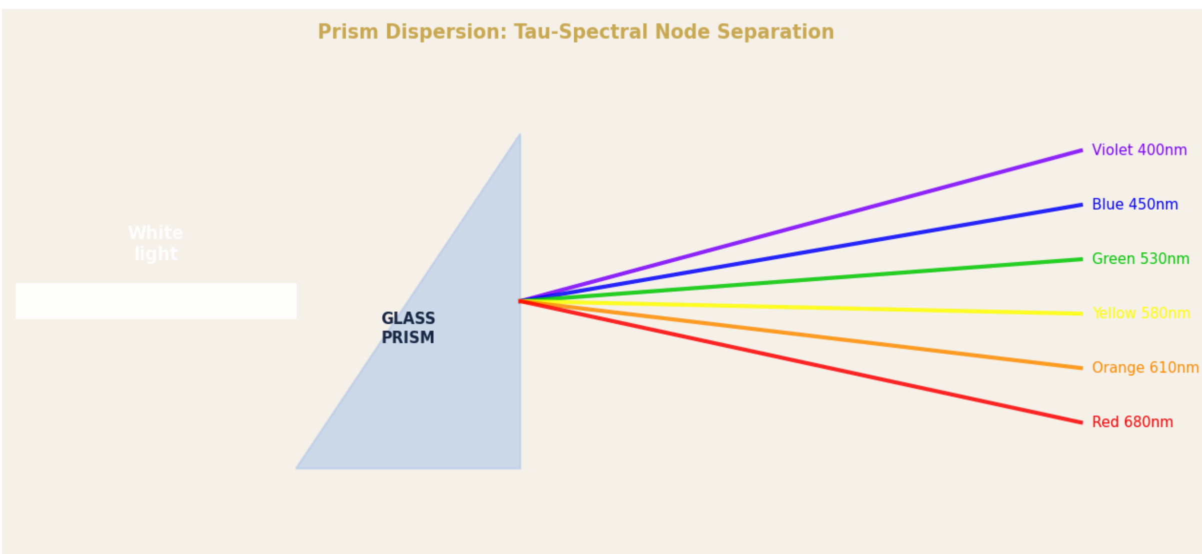

Figure 2. Prism dispersion diagram. White light enters; tau-spectral nodes separate by wavelength. Violet (highest n, most bent) at top; red (lowest n) at bottom.

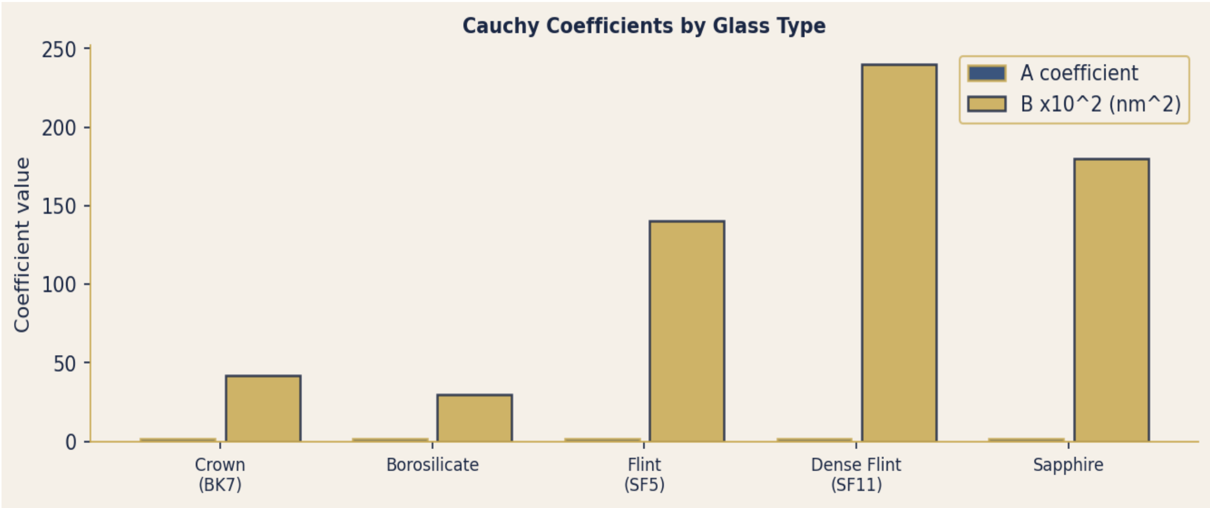

Figure 3. Cauchy A and B coefficients for five glass types. A near 3/2=1.5 confirms {3,2}-register. Flint glasses have larger B (higher tau-node density gradient).

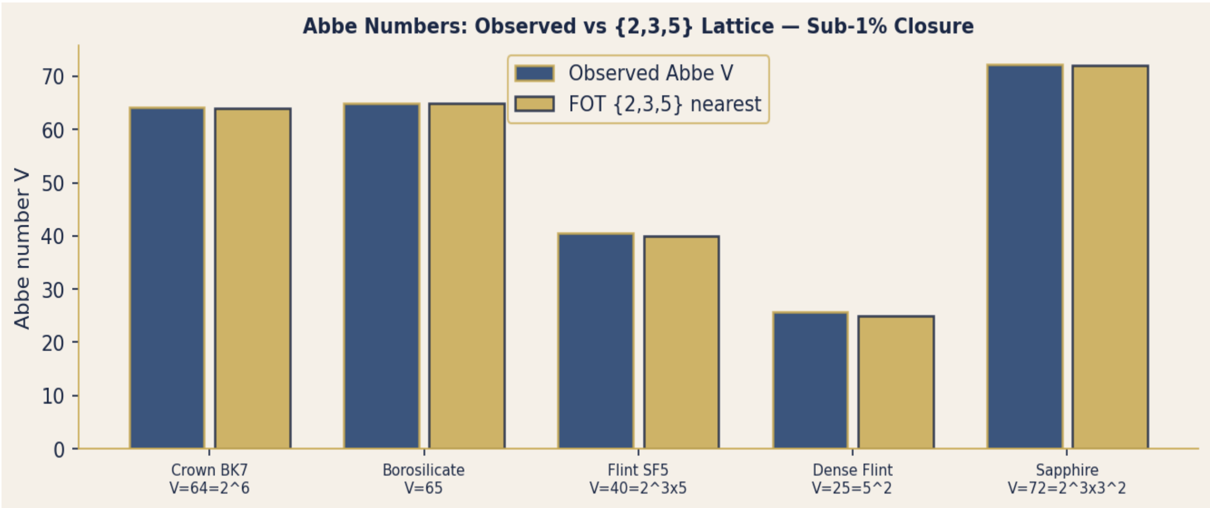

Figure 4. Abbe numbers: observed (navy) vs FOT {2,3,5} lattice values (gold). 64=2^6, 40=2^3x5, 25=5^2, 72=2^3x3^2 — all pure {2,3,5} integers.