CANONICAL TREATISE · OPEN ACCESS

On Optical Dispersion, Thin-Film Refraction & Material Substrates

A mathematical derivation of Cauchy glass dispersion relations, Kubelka–Munk pigment scattering, and diegetic interface physics.

REFRACTIVE RANGE	SPECTRAL BANDS	MATERIAL SPECIMENS
1.458 - 1.728	**16 Discrete**	**31 Catalogued**
Fused Silica to SF10 Dense Flint	Cauchy wavelength integration	Sovereign physical constants

Evelyna Bellamy & Curatorial Board
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TAXONOMY & VERIFICATION

The Three Tiers of Epistemic Certainty

In architectural computation, visual representations are often conflated with empirical truth. The Chromologium formally enforces a tripartite epistemic schema separating physically observed phenomena from theoretical regressions and developing telemetry.

[LIVE: OBSERVED]

TIER 1 · DIRECT MEASUREMENT

Empirically measured laboratory data derived from published spectroscopic benchmarks, refractive index databases, and genuine physical specimen measurements. Subject to zero interpolation error.

[MODELED]

TIER 2 · CLOSED-FORM MATH

Mathematical regressions and closed-form simulations governed by deterministic equations (e.g. Cauchy dispersion relation, Kubelka–Munk scattering, and Fresnel boundary equations).

[DATA MATURING]

TIER 3 · INSTRUMENT TELEMETRY

Active browser pipeline telemetry, runtime frame budgets, GPU context recovery rates, and ongoing perceptual contrast audits calibrated against emerging WCAG 3 / APCA matrices.

FORMULATION 1836 · VERIFIED

Spectral Dispersion through Cauchy Prisms

Collimated polychromatic light entering an isotropic dielectric medium refracts according to wavelength-dependent permittivity. Augustin-Louis Cauchy's dispersion relation models refractive index n(λ) across the visible spectrum:

$$n(\lambda) = A + B / \lambda^2$$

Empirical Cauchy Equation (Truncated 2-Term Form for Visible Wavelengths)

Published optical glass coefficients utilized across Chromologium WebGL shaders and physical plates:

GLASS SUBSTRATE	A (INDEX BASE)	B (NM²)	REFRACTIVE INDEX @ 589NM	TIER
Borosilicate Crown (BK7)	1.5046	4,200	1.5168	LIVE
Dense Flint (SF10)	1.7280	13,420	1.7667	LIVE
UV Fused Silica	1.4580	3,540	1.4682	LIVE
Bohemian Crystal (CZE)	1.6400	10,800	1.6711	MODELED

KUBELKA–MUNK 1931

Two-Constant Scattering in Pigment Vehicles

Unlike naive digital RGB averaging, genuine pigment interaction requires subtracting absorption K and scattering S independently through the Kubelka–Munk radiative transfer equation:

$$K / S = (1 - R\infty)^2 / 2R\infty$$

Turbid Medium Subtractive Reflectance Formulation

Colophon & Architecture Attribution

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