

CIELAB 1976 $L^*a^*b^*$ -Farbraum Definition und Umkehrung

$$L^* = 116 (Y/Y_n)^{1/3} - 16 \quad [Y/Y_n]^{1/3} > 24/116$$

$$a^* = 500 [(X/X_n)^{1/3} - (Y/Y_n)^{1/3}] \quad Y > 0,885$$

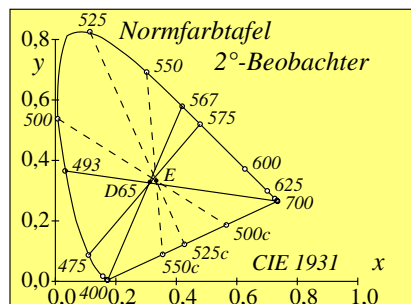
$$b^* = 200 [(Y/Y_n)^{1/3} - (Z/Z_n)^{1/3}]$$

$$X = X_n [(L^* + 16) / 116 + a^*/500]^3$$

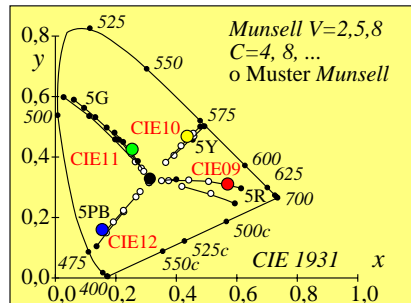
$$Y = Y_n [(L^* + 16) / 116]^3$$

$$Z = Z_n [(L^* + 16) / 116 - b^*/200]^3$$

CGS20-1N



CGS20-3N



CGS20-5N

CIELAB 1976 $L^*a^*b^*$ -Farbraum Definition und Ableitung ($X_u/X_n=Y_u/Y_n=Z_u/Z_n=0,18$)

$$L^* = 116 (Y/Y_n)^{1/3} - 16 \quad [Y/Y_n]^{1/3} > 24/116$$

$$a^* = 500 [(X/X_n)^{1/3} - (Y/Y_n)^{1/3}] \quad Y > 0,885$$

$$b^* = 200 [(Y/Y_n)^{1/3} - (Z/Z_n)^{1/3}]$$

$$dL^*/dY = 116 [(Y/Y_n)^{-2/3} / (3Y_n)] \quad Y_n=100$$

$$da^*/dY = 500 [(X/X_n)^{-2/3} / (3X_n) - (Y/Y_n)^{-2/3} / (3Y_n)]$$

$$db^*/dY = 200 [(Y/Y_n)^{-2/3} / (3Y_n) - (Z/Z_n)^{-2/3} / (3Z_n)]$$

$$c_u = [Y_u/Y_n]^{1/3} = 0,18^{1/3} = 0,5647, \text{ ähnlich für } X, Z$$

$$u_1 = 116c_u = 65,51, u_a = 500c_u = 282,35, u_b = 200c_u = 112,94$$

CGS20-7N

Q-Funktions-Änderung; Übergang von der Licht- zur Farb-Metrik

Stufungsfunktion der **Lichtmetrik**:

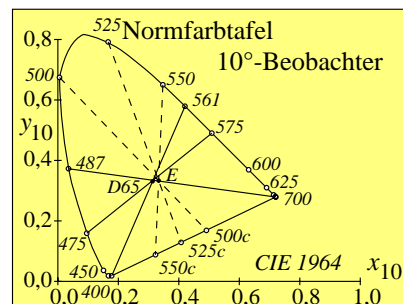
$$Q[k(x-u)] = Q[k(\log L - \log L_u)]$$

log L → log P für **Farbmetrik**:

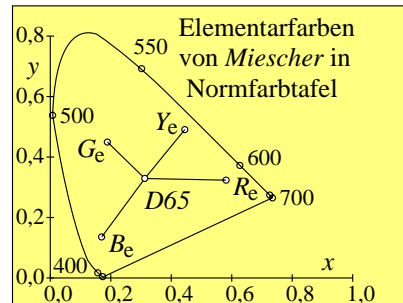
$$Q[k(\log P - \log L_u)] = Q[k(\log L - \log L_u + \log P - \log L)]$$

mit Sättigung $p = \log P - \log L$
für **Farbmetrik**: $Q[k(x-u+p)]$

CGS20-2N



CGS20-4N



CGS20-6N

CIELAB_u 2022 $L^*u^*v^*$ -Farbraum Definition und Ableitung ($X_u/X_n=Y_u/Y_n=Z_u/Z_n=0,18$)

$$L^*u = 65,51 (Y/Y_u)^{1/3} - 16 = L^*_{CIELAB} - 0,49$$

$$a^*u = 282,35 [(X/X_u)^{1/3} - (Y/Y_u)^{1/3}] = a^*_{CIELAB}$$

$$b^*u = 112,94 [(Y/Y_u)^{1/3} - (Z/Z_u)^{1/3}] = b^*_{CIELAB}$$

$$dL^*u/dY = 65,51 [(Y/Y_u)^{-2/3} / (3Y_u)] \quad Y_u=18$$

$$da^*u/dY = 284,56 [(X/X_u)^{-2/3} / (3X_u) - (Y/Y_u)^{-2/3} / (3Y_u)]$$

$$db^*u/dY = 113,78 [(Y/Y_u)^{-2/3} / (3Y_u) - (Z/Z_u)^{-2/3} / (3Z_u)]$$

$$c_u = [Y_u/Y_n]^{1/3} = 0,18^{1/3} = 0,5647, \text{ ähnlich für } X, Z$$

$$u_1 = 116c_u = 65,51, u_a = 500c_u = 282,35, u_b = 200c_u = 112,94$$

CGS20-8N

CIELAB 1976 $L^*a^*b^*$ -Farbraum und CIELAB_u 2022 $L^*u^*v^*$ -Farbraum

$$L^* = 116 (Y/Y_n)^{1/3} - 16 \quad [Y/Y_n]^{1/3} > 24/116$$

$$a^* = 500 [(X/X_n)^{1/3} - (Y/Y_n)^{1/3}] \quad Y > 0,885$$

$$b^* = 200 [(Y/Y_n)^{1/3} - (Z/Z_n)^{1/3}]$$

$$L^*u = 116 c_u (Y/Y_u)^{1/3} - 16 = L^* - 0,49 \quad Y_u=18$$

$$a^*u = 500 c_u [(X/X_u)^{1/3} - (Y/Y_u)^{1/3}] = a^*$$

$$b^*u = 200 c_u [(Y/Y_u)^{1/3} - (Z/Z_u)^{1/3}] = b^*$$

$$c_u = [Y_u/Y_n]^{1/3} = 0,18^{1/3} = 0,5647, \text{ ähnlich für } X, Z$$

$$u_1 = 116c_u = 65,51, u_a = 500c_u = 282,35, u_b = 200c_u = 112,94$$

CGS21-1N

CIELAB_u 2022 $L^*u^*v^*$ -Farbraum Definition und Umkehrung ($X_u/X_n=Y_u/Y_n=Z_u/Z_n=0,18$)

$$L^*u = 116 c_u (Y/Y_u)^{1/3} - 16 = L^*_{CIELAB} - 0,49$$

$$a^*u = 500 c_u [(X/X_u)^{1/3} - (Y/Y_u)^{1/3}] = a^*_{CIELAB}$$

$$b^*u = 200 c_u [(Y/Y_u)^{1/3} - (Z/Z_u)^{1/3}] = b^*_{CIELAB}$$

$$X = X_u [(L^*u + 16) / (116c_u) + a^*u / (500c_u)]^3$$

$$Y = Y_u [(L^*u + 16) / (116c_u)]^3 \quad Y_u=18$$

$$Z = Z_u [(L^*u + 16) / (116c_u) - b^*u / (200c_u)]^3$$

$$c_u = [Y_u/Y_n]^{1/3} = 0,18^{1/3} = 0,5647, \text{ ähnlich für } X, Z$$

$$u_1 = 116c_u = 65,51, u_a = 500c_u = 282,35, u_b = 200c_u = 112,94$$

CGS21-3N

CIELAB_u 2022 $L^*u^*v^*$ -Farbraum Definition und Umkehrung ($X_u/X_n=Y_u/Y_n=Z_u/Z_n=0,18$)

$$L^*u = u_1 (Y/Y_u)^{1/3} - 16 = L^*_{CIELAB} - 0,49$$

$$a^*u = u_a [(X/X_u)^{1/3} - (Y/Y_u)^{1/3}] = a^*_{CIELAB}$$

$$b^*u = u_b [(Y/Y_u)^{1/3} - (Z/Z_u)^{1/3}] = b^*_{CIELAB}$$

$$X = X_u [(L^*u + 16) / u_1 + a^*u / u_a]^3$$

$$Y = Y_u [(L^*u + 16) / u_1]^3 \quad Y_u=18$$

$$Z = Z_u [(L^*u + 16) / u_1 - b^*u / u_b]^3$$

$$c_u = [Y_u/Y_n]^{1/3} = 0,18^{1/3} = 0,5647, \text{ ähnlich für } X, Z$$

$$u_1 = 116c_u = 65,51, u_a = 500c_u = 282,35, u_b = 200c_u = 112,94$$

CGS21-5N

CIELAB_u 2022 $L^*u^*v^*$ -Farbraum Definition und Umkehrung ($X_u/X_n=Y_u/Y_n=Z_u/Z_n=0,18$)

$$L^*u = 65,51 (Y/Y_u)^{1/3} - 16 = L^*_{CIELAB} - 0,49$$

$$a^*u = 282,35 [(X/X_u)^{1/3} - (Y/Y_u)^{1/3}] = a^*_{CIELAB}$$

$$b^*u = 112,94 [(Y/Y_u)^{1/3} - (Z/Z_u)^{1/3}] = b^*_{CIELAB}$$

$$X = X_u [(L^*u + 16) / 65,51 + a^*u / 282,35]^3$$

$$Y = Y_u [(L^*u + 16) / 65,51]^3 \quad Y_u=18$$

$$Z = Z_u [(L^*u + 16) / 65,51 - b^*u / 112,94]^3$$

$$c_u = [Y_u/Y_n]^{1/3} = 0,18^{1/3} = 0,5647, \text{ ähnlich für } X, Z$$

$$u_1 = 116c_u = 65,51, u_a = 500c_u = 282,35, u_b = 200c_u = 112,94$$

CGS21-7N

CIELAB 1976 $L^*a^*b^*$ -Farbraum und CIELAB_v 2022 $L^*v^*w^*$ -Farbraum

$$L^* = 116 (Y/Y_n)^{1/3} - 16 \quad [Y/Y_n]^{1/3} > 24/116$$

$$a^* = 500 [(X/X_n)^{1/3} - (Y/Y_n)^{1/3}] \quad Y > 0,885$$

$$b^* = 200 [(Y/Y_n)^{1/3} - (Z/Z_n)^{1/3}]$$

$$L^*v = 116 c_v (Y/Y_v)^{1/3} - 16 = L^* \quad Y_v=18,41$$

$$a^*v = 500 c_v [(X/X_v)^{1/3} - (Y/Y_v)^{1/3}] = a^*$$

$$b^*v = 200 c_v [(Y/Y_v)^{1/3} - (Z/Z_v)^{1/3}] = b^*$$

$$c_v = [Y_v/Y_n]^{1/3} = 0,1841^{1/3} = 0,5689, \text{ ähnlich für } X, Z$$

$$v_1 = 116c_v = 66, v_a = 500c_v = 284,56, v_b = 200c_v = 113,78$$

CGS21-2N

CIELAB_v 2022 $L^*v^*w^*$ -Farbraum Definition und Umkehrung ($X_v/X_n=Y_v/Y_n=Z_v/Z_n=0,1841$)

$$L^*v = 116 c_v (Y/Y_v)^{1/3} - 16 = L^*_{CIELAB}$$

$$a^*v = 500 c_v [(X/X_v)^{1/3} - (Y/Y_v)^{1/3}] = a^*_{CIELAB}$$

$$b^*v = 200 c_v [(Y/Y_v)^{1/3} - (Z/Z_v)^{1/3}] = b^*_{CIELAB}$$

$$X = X_v [(L^*v + 16) / (116c_v) + a^*v / (500c_v)]^3$$

$$Y = Y_v [(L^*v + 16) / (116c_v)]^3 \quad Y_v=18,41$$

$$Z = Z_v [(L^*v + 16) / (116c_v) - b^*v / (200c_v)]^3$$

$$c_v = [Y_v/Y_n]^{1/3} = 0,1841^{1/3} = 0,5689, \text{ ähnlich für } X, Z$$

$$v_1 = 116c_v = 66, v_a = 500c_v = 284,56, v_b = 200c_v = 113,78$$

CGS21-4N

CIELAB_v 2022 $L^*v^*w^*$ -Farbraum Definition und Umkehrung ($X_v/X_n=Y_v/Y_n=Z_v/Z_n=0,1841$)

$$L^*v = v_1 (Y/Y_v)^{1/3} - 16 = L^*_{CIELAB}$$

$$a^*v = v_a [(X/X_v)^{1/3} - (Y/Y_v)^{1/3}] = a^*_{CIELAB}$$

$$b^*v = v_b [(Y/Y_v)^{1/3} - (Z/Z_v)^{1/3}] = b^*_{CIELAB}$$

$$X = X_v [(L^*v + 16) / v_1 + a^*v / v_a]^3$$

$$Y = Y_v [(L^*v + 16) / v_1]^3 \quad Y_v=18,41$$

$$Z = Z_v [(L^*v + 16) / v_1 - b^*v / v_b]^3$$

$$c_v = [Y_v/Y_n]^{1/3} = 0,1841^{1/3} = 0,5689, \text{ ähnlich für } X, Z$$

$$v_1 = 116c_v = 66, v_a = 500c_v = 284,56, v_b = 200c_v = 113,78$$

CGS21-6N

CIELAB_v 2022 $L^*v^*w^*$ -Farbraum Definition und Umkehrung ($X_v/X_n=Y_v/Y_n=Z_v/Z_n=0,1841$)

$$L^*v = 66 (Y/Y_v)^{1/3} - 16 = L^*_{CIELAB}$$

$$a^*v = 284,56 [(X/X_v)^{1/3} - (Y/Y_v)^{1/3}] = a^*_{CIELAB}$$

$$b^*v = 113,78 [(Y/Y_v)^{1/3} - (Z/Z_v)^{1/3}] = b^*_{CIELAB}$$

$$X = X_v [(L^*v + 16) / 66 + a^*v / 284,56]^3$$

$$Y = Y_v [(L^*v + 16) / 66]^3 \quad Y_v=18,41$$

$$Z = Z_v [(L^*v + 16) / 66 - b^*v / 113,78]^3$$

$$c_v = [Y_v/Y_n]^{1/3} = 0,1841^{1/3} = 0,5689, \text{ ähnlich für } X, Z$$

$$v_1 = 116c_v = 66, v_a = 500c_v = 284,56, v_b = 200c_v = 113,78$$

CGS21-8N