

CIELAB 1976 $L^*a^*b^*$ color space

definition and derivation ($X_u/X_n=Y_u/Y_n=Z_u/Z_n=0,18$)

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

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

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

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

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

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

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

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