

CIELAB_u 2022 L^*u a^*u b^*u color space
 definition and derivation ($X_u/X_n=Y_u/Y_n=Z_u/Z_n=0,18$)

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

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

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

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

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

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

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

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