

CIELAB 1976  $L^*a^*b^*$  color space and  
 CIELAB<sub>v</sub> 2022  $L^{*v} a^{*v} b^{*v}$  color space

$$\begin{aligned}
 L^* &= 116 (Y/Y_n)^{1/3} - 16 & [Y/Y_n]^{1/3} > 24/116 \\
 a^* &= 500 [ (X/X_n)^{1/3} - (Y/Y_n)^{1/3} ] & Y > 0,885 \\
 b^* &= 200 [ (Y/Y_n)^{1/3} - (Z/Z_n)^{1/3} ]
 \end{aligned}$$

$$\begin{aligned}
 L^{*v} &= 116 c_v (Y/Y_v)^{1/3} - 16 = L^* & Y_v = 18,41 \\
 a^{*v} &= 500 c_v [ (X/X_v)^{1/3} - (Y/Y_v)^{1/3} ] = a^* \\
 b^{*v} &= 200 c_v [ (Y/Y_v)^{1/3} - (Z/Z_v)^{1/3} ] = b^*
 \end{aligned}$$

$$\begin{aligned}
 c_v &= [Y_v/Y_n]^{1/3} = 0,1841^{1/3} = 0,5689, \text{ similar for } X, Z \\
 v_L &= 116c_v = 66, \quad v_a = 500c_v = 284,56, \quad v_b = 200c_v = 113,78
 \end{aligned}$$