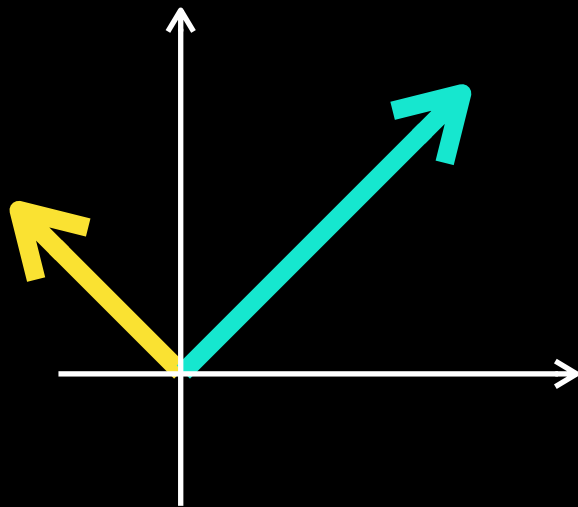


# Example of 3D-3D transformation

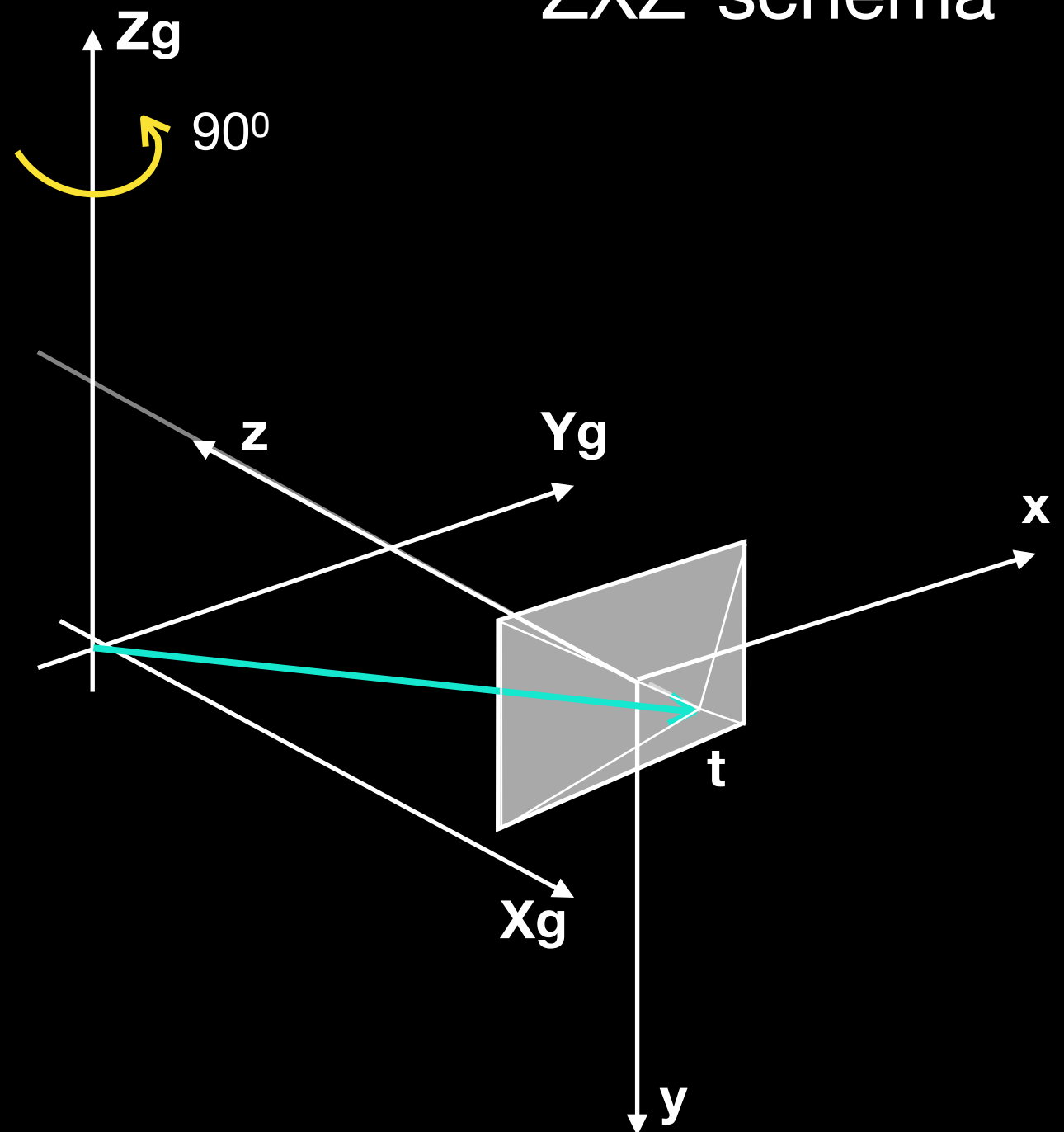
Linear Algebra Essentials



$$t = \begin{vmatrix} 4 \\ 0 \\ 1 \end{vmatrix}$$

$$\alpha_1 = \pi/2 \quad c_1 = 0, \quad s_1 = 1$$

ZXZ-schema

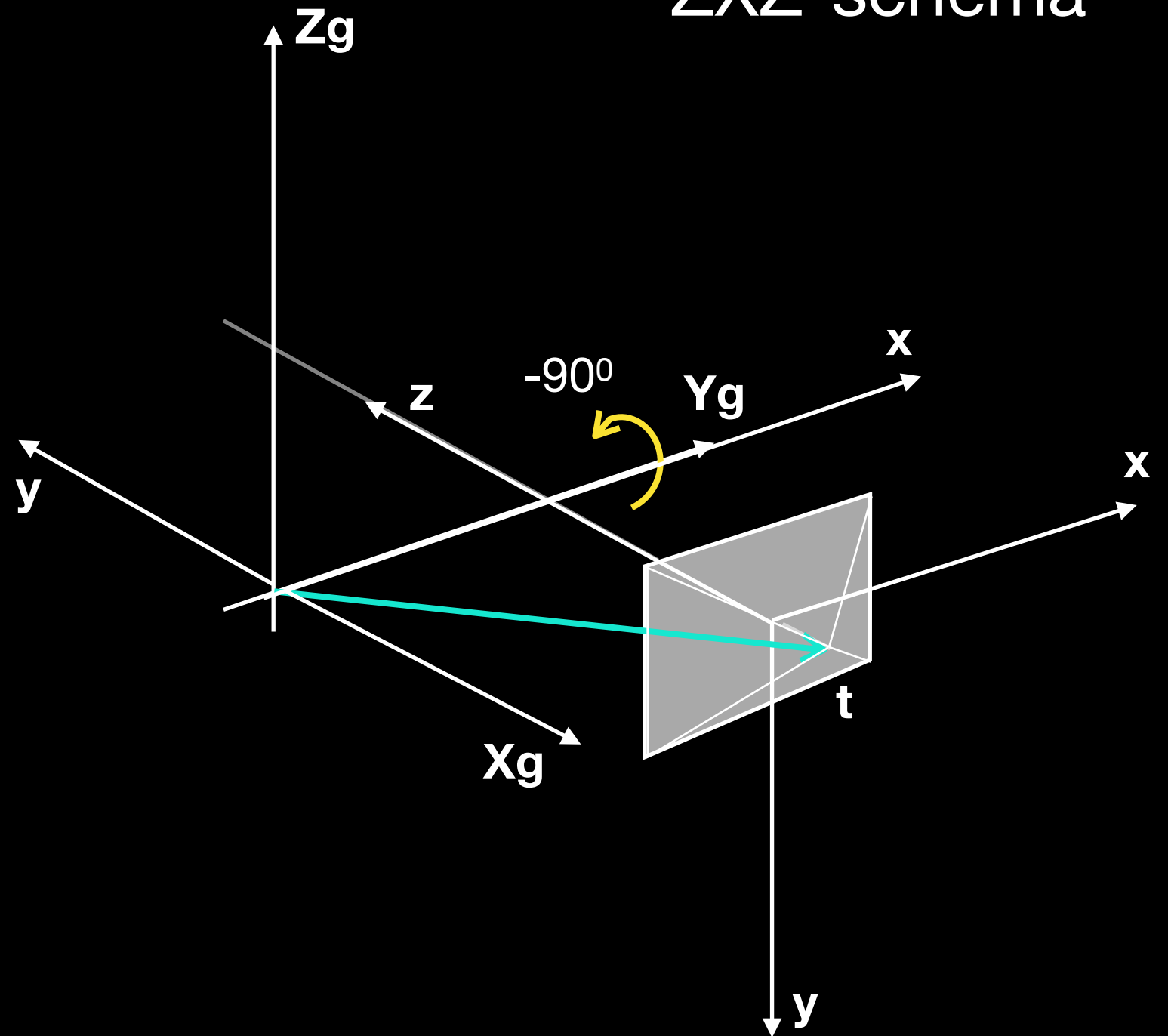


# ZXZ-schema

$$t = \begin{vmatrix} 4 \\ 0 \\ 1 \end{vmatrix}$$

$$\alpha_1 = \pi/2 \quad c_1 = 0, \quad s_1 = 1$$

$$\alpha_2 = -\pi/2 \quad c_2 = 0, \quad s_2 = -1$$



# ZXZ-schema

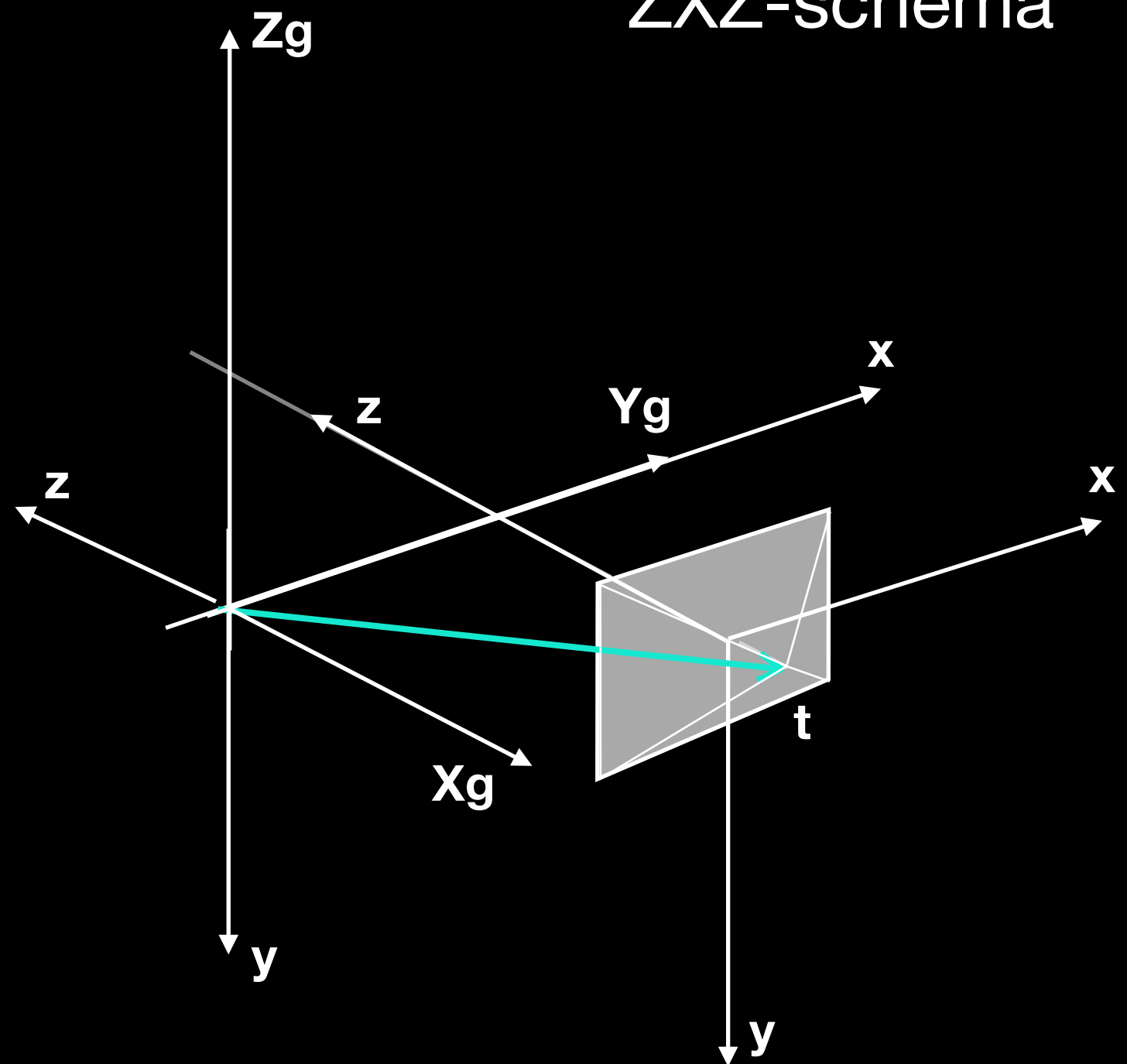
$$t = \begin{vmatrix} 4 \\ 0 \\ 1 \end{vmatrix}$$

$$\alpha_1 = \pi/2 \quad c_1 = 0, \quad s_1 = 1$$

$$\alpha_2 = -\pi/2 \quad c_2 = 0, \quad s_2 = -1$$

$$\alpha_3 = 0 \quad c_3 = 1, \quad s_3 = 0$$

$$Z_1 X_2 Z_3 = \begin{bmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{bmatrix} = R$$



[https://en.wikipedia.org/wiki/Euler\\_angles](https://en.wikipedia.org/wiki/Euler_angles)

$$Z_1 X_2 Z_3 = \begin{bmatrix} c_1 c_3 - c_2 s_1 s_3 & -c_1 s_3 - c_2 c_3 s_1 & s_1 s_2 \\ c_3 s_1 + c_1 c_2 s_3 & c_1 c_2 c_3 - s_1 s_3 & -c_1 s_2 \\ s_2 s_3 & c_3 s_2 & c_2 \end{bmatrix}$$

# ZXZ-schema

$$t = \begin{vmatrix} 4 \\ 0 \\ 1 \end{vmatrix}$$

$$\alpha_1 = \pi/2 \quad c_1 = 0, \quad s_1 = 1$$

$$\alpha_2 = -\pi/2 \quad c_2 = 0, \quad s_2 = -1$$

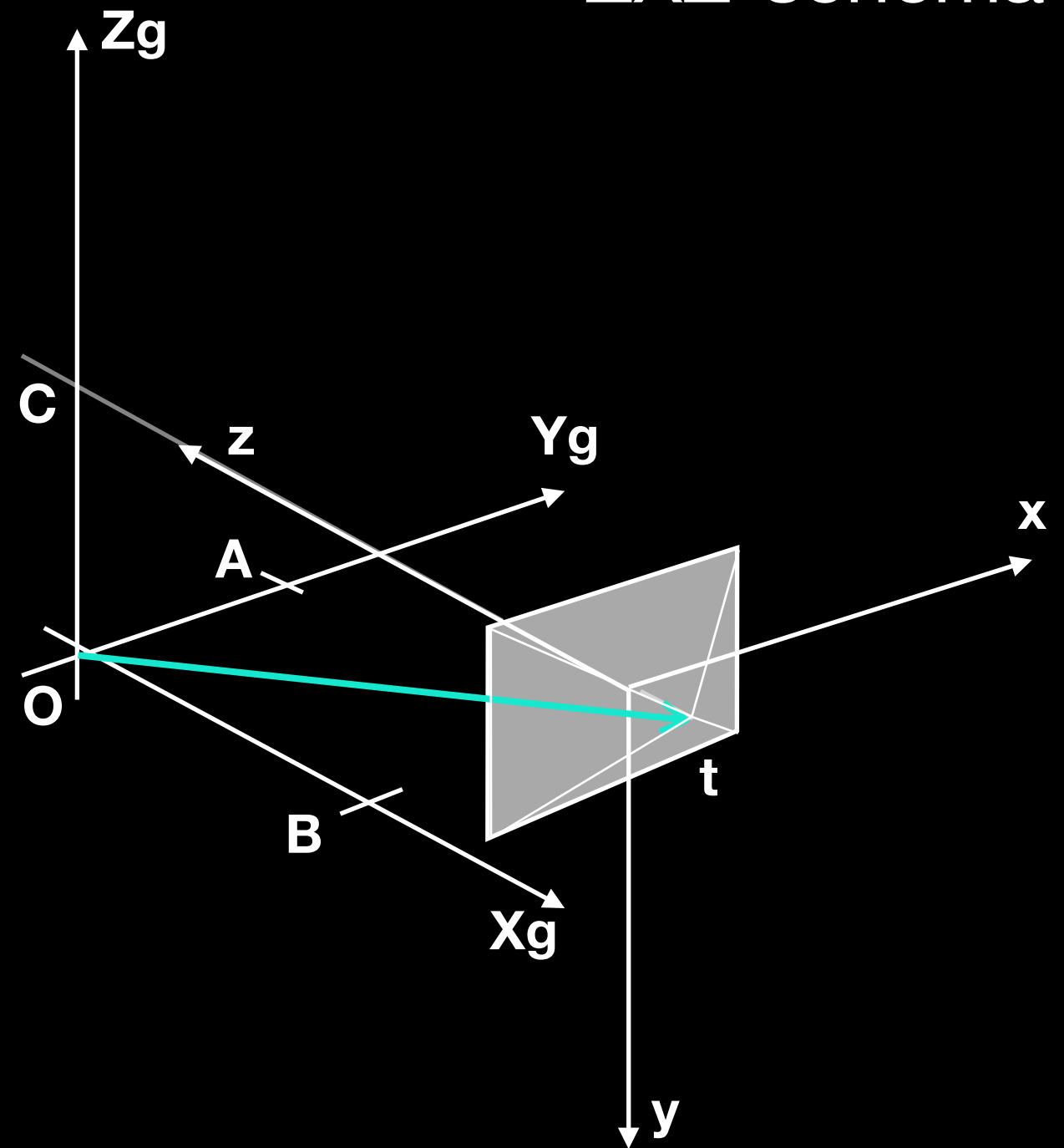
$$\alpha_3 = 0 \quad c_3 = 1, \quad s_3 = 0$$

$$Z_1 X_2 Z_3 = \begin{bmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{bmatrix} = R$$

$$E = (R^T | -R^T t) = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 1 \\ -1 & 0 & 0 & 4 \end{bmatrix}$$

$$O : E \cdot (0,0,0,1) = (0,1,4)$$

$$A : E \cdot (0,1,0,1) = (1,1,4)$$



$$B : E \cdot (2,0,0,1) = (0,1,2)$$

$$C : E \cdot (0,0,1,1) = (0,0,4)$$