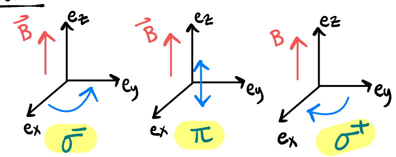
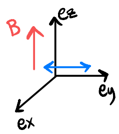
Note:





$$= \frac{1}{\sqrt{2i}}(\hat{e}_+ - \hat{e}_-)$$

$$= \frac{1}{\sqrt{2i}}\left[\frac{e_x + i\hat{e}_y}{\sqrt{2}} - \frac{\hat{e}_x - i\hat{e}_y}{\sqrt{2}}\right]$$

By convention, the quantization axis $\hat{z} = \vec{B}/|\vec{B}|$. Therefore, the quantization axis changes moving from region A to B. Beam 1 and beam 2 (both equally red-detuned) drives $\sigma^\pm$ transition depending on the local quantization axis (local direction of $\vec{B}$)