$$R = \begin{bmatrix} | & | & | \\ \frac{1}{\sqrt{2}}(v_1 + iv_2) & \frac{1}{\sqrt{2}}(v_1 - iv_2) & v_3 \\ | & | & | \end{bmatrix} \begin{bmatrix} e^{-i\theta} & 0 & 0 \\ 0 & e^{i\theta} & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} - & \frac{1}{\sqrt{2}}(v_1^T - iv_2^T) & - \\ - & \frac{1}{\sqrt{2}}(v_1^T + iv_2^T) & - \\ - & v_3^T & - \end{bmatrix}$$

U **right eigenvectors** U^* **left eigenvectors**

unitary: $U^*U = UU^* = I$