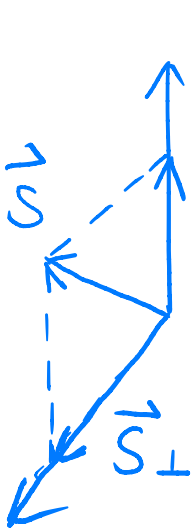
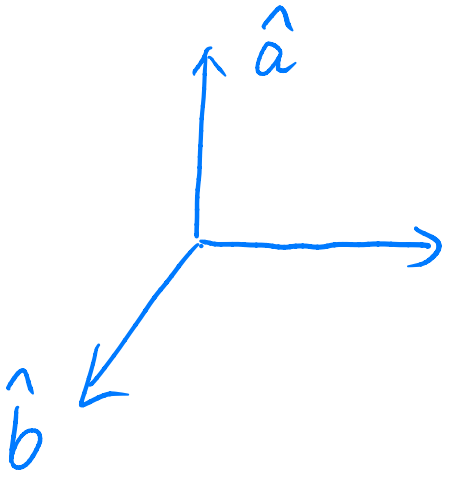
Step 1:



$$\vec{s}_{//} = \text{proj}(\vec{s}, \hat{a}) = \hat{a}(\vec{s} \cdot \hat{a}) = a a^T \vec{s}$$

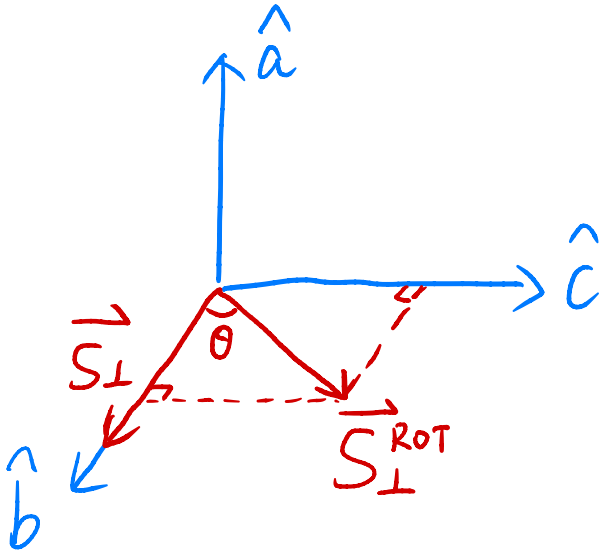
$$\hat{b} = \text{normalize}(\vec{s}_{\perp}) = \frac{\vec{s}_{\perp}}{\|\vec{s}_{\perp}\|}$$

Step 2:



$$\hat{c} = \hat{a} \times \hat{b} = \frac{\hat{a} \times \vec{s}_{\perp}}{\|\vec{s}_{\perp}\|} = \frac{\hat{a} \times \vec{s}}{\|\vec{s}_{\perp}\|}$$

Step 3:



$$\vec{s}_{\perp}^{\,ROT} = \|\vec{s}_{\perp}\| \cos\theta \, \hat{b} + \|\vec{s}_{\perp}\| \sin\theta \, \hat{c}$$