

Figure 1.13: Diagram showing the various parameters used in Eq. (??). (left) Shows the Stokes ellipse (blue) where  $Q = \cos(2\psi)\cos(2\chi)$  and  $\mathcal{V} = \sin(2\chi)$ , and  $(\hat{x}_L, \hat{y}_L)$ represents the lab reference frame. Note that  $\hat{k}_{\perp} = \hat{y}\cos(\theta_k) + \hat{z}\sin(\theta_k)$  and in this case the probe beam wavevector k is out of the page. (right) Shows how the magnetic quantization axis is assumed to be along the z-axis, with the plane spanned by it and the probe beam wavevector forming the zy-plane.

we have

$$\cos(2\chi) = \cos(\chi)^2 - 2\sin(\chi)^2$$
 (1.110)

$$= \left(\frac{a}{\sqrt{a^2 + b^2}}\right)^2 - \left(\frac{b}{\sqrt{a^2 + b^2}}\right)^2 \tag{1.111}$$

$$=\frac{a^2-b^2}{a^2+b^2} \tag{1.112}$$

$$\Rightarrow \mathcal{Q} = \frac{p_{max} - p_{min}}{p_{max} + p_{min}} \cos(2\theta_{\varepsilon})$$
 (1.113)

$$\sin(2\chi) = 2\sin(\chi)\cos(\chi) \tag{1.114}$$

$$=2\frac{a}{\sqrt{a^2+b^2}}\frac{b}{\sqrt{a^2+b^2}}\tag{1.115}$$

$$=\frac{2ab}{a^2+b^2} (1.116)$$

$$= \frac{2ab}{a^2 + b^2}$$

$$\Rightarrow |\mathcal{V}| = \frac{2\sqrt{p_{min}p_{max}}}{p_{min} + p_{max}}$$

$$(1.116)$$