

# КВАНТОВАЯ ТОМОГРАФИЯ

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# Томография одномодового состояния

- Волновая функция

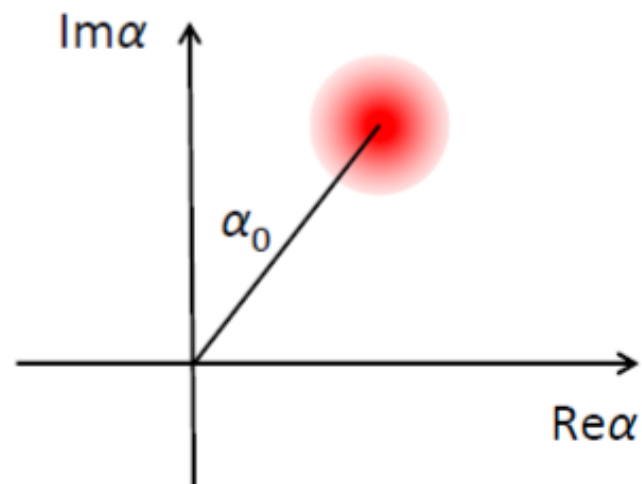
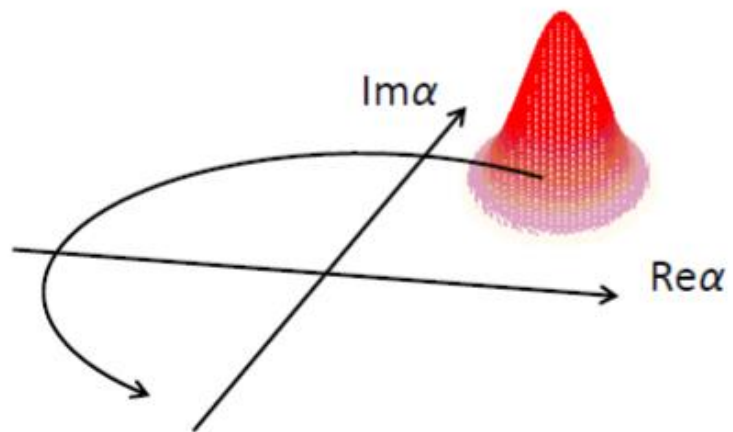
$$|\Psi\rangle = \sum_n C_n |n\rangle$$

- Матрица плотности

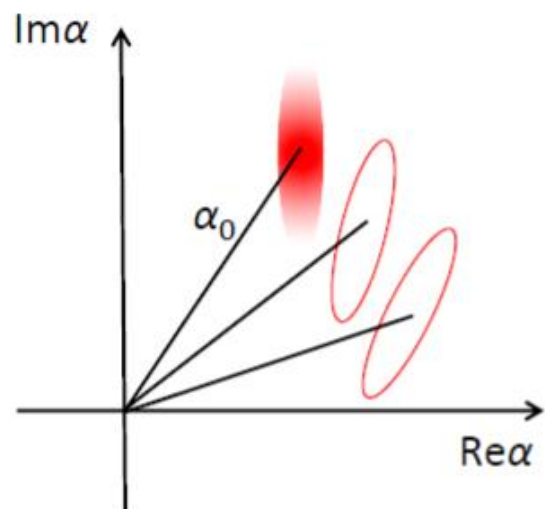
- Функция Вигнера

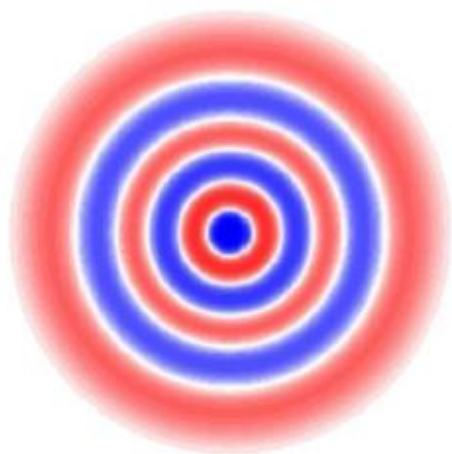
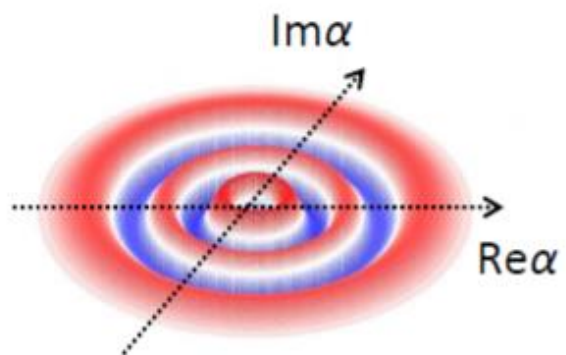
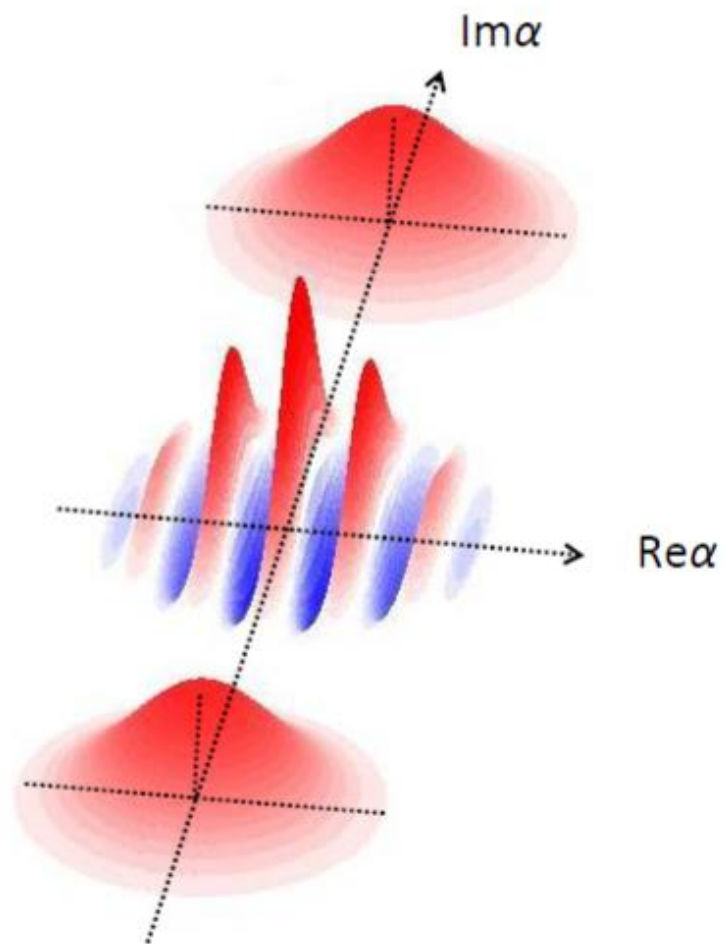
$$W(\alpha, \alpha^*) = \frac{1}{\pi^2} \iint \langle e^{(\beta \hat{a}^\dagger - \beta^* \hat{a})} \rangle e^{(\alpha \beta^* - \alpha^* \beta)} d^2 \beta$$

## Когерентное состояние

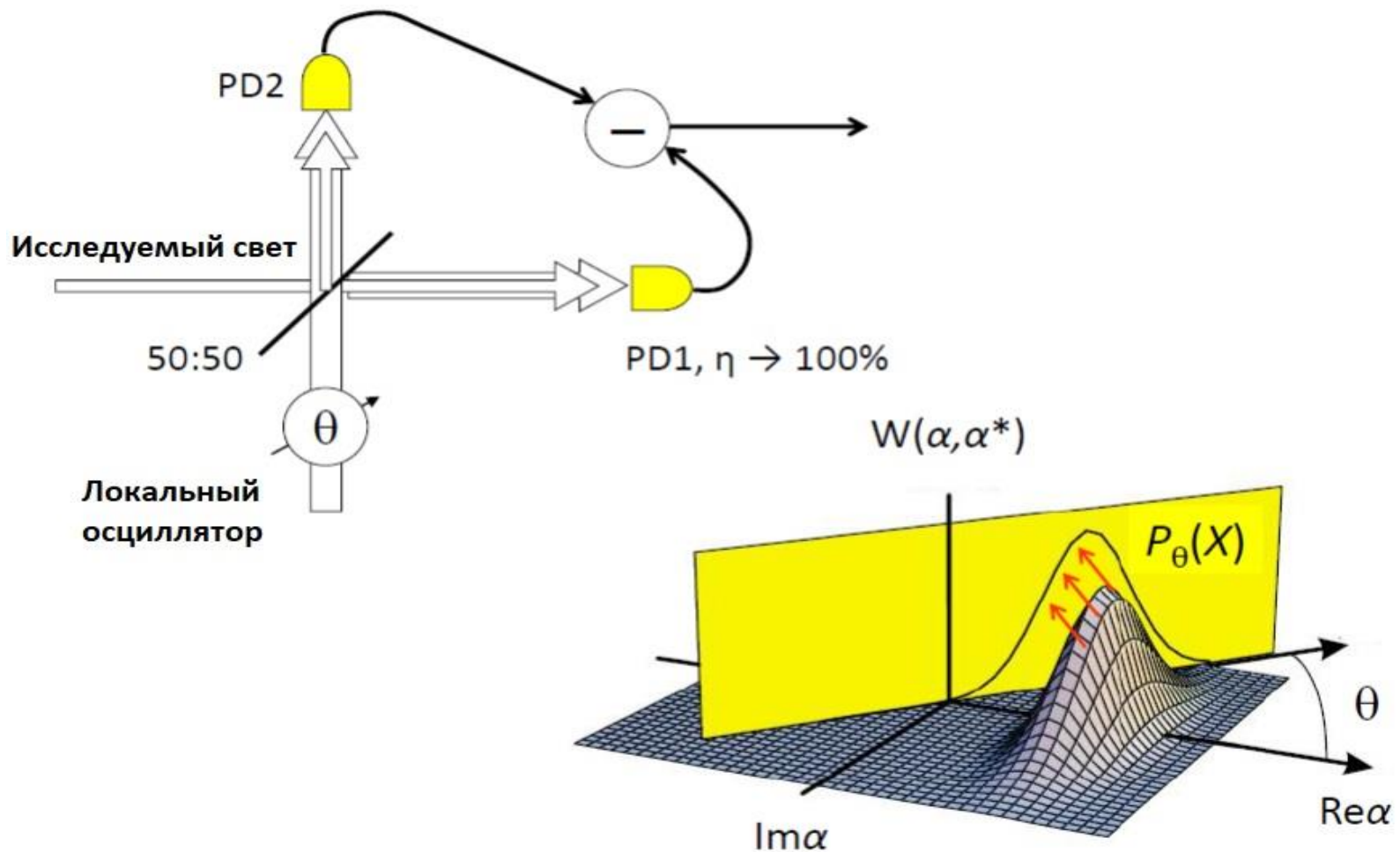


## Сжатое состояние

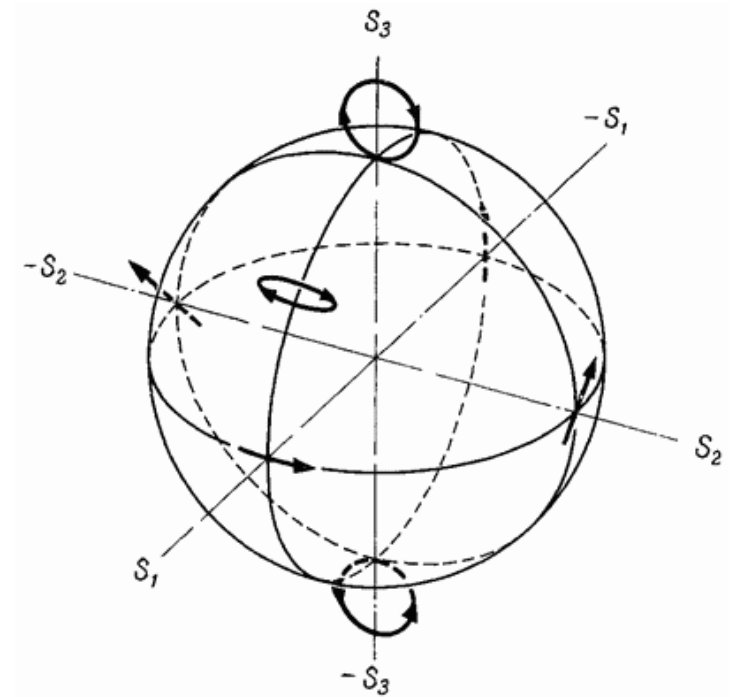
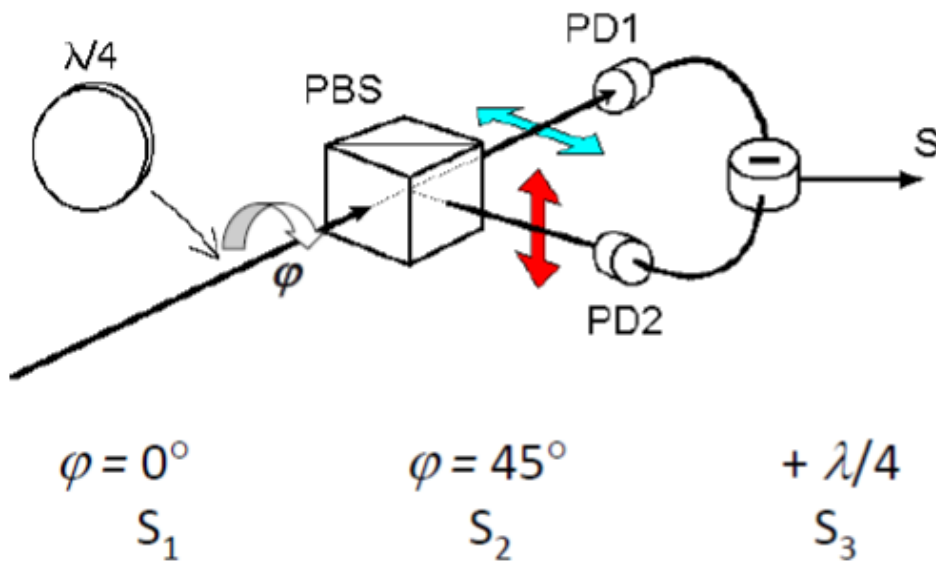


$|n\rangle$  $C_1|\alpha_0\rangle + C_2|-\alpha_0\rangle$ 

# Балансное гомодинное детектирование

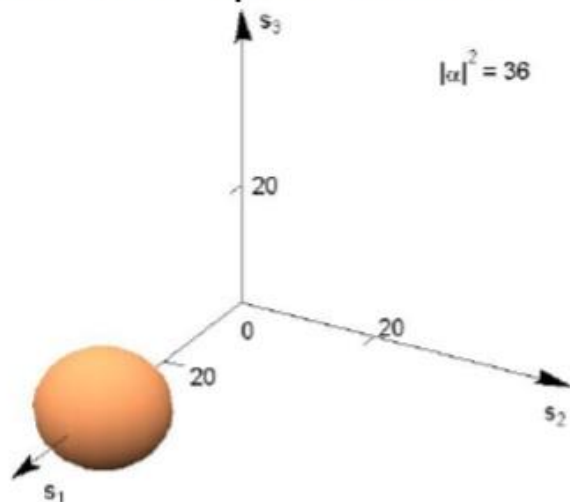


# Поляризационная томография

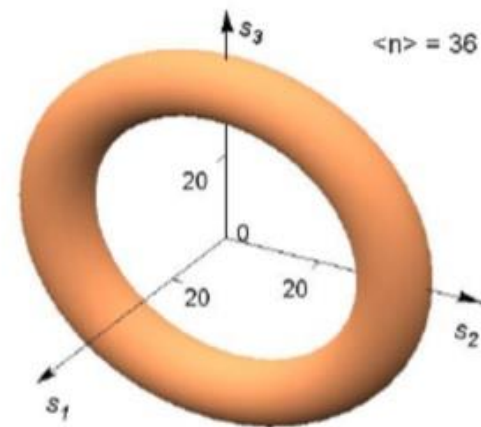


$$W(s_1, s_2, s_3) = \frac{1}{(2\pi)^3} \iiint \langle e^{(iu_1 \hat{S}_1 + iu_2 \hat{S}_2 + iu_3 \hat{S}_3)} \rangle e^{(-iu_1 s_1 - iu_2 s_2 - iu_3 s_3)} du_1 du_2 du_3$$

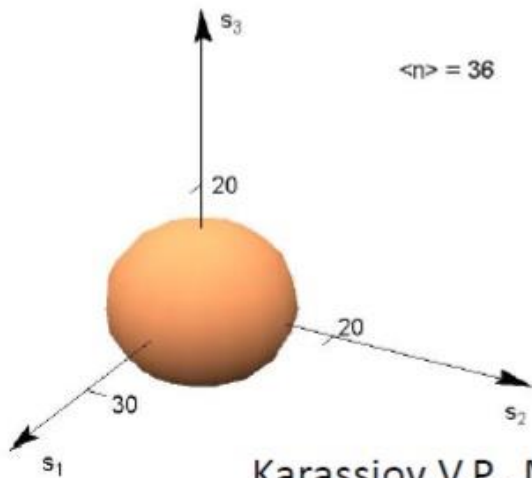
### Линейно поляризованный свет



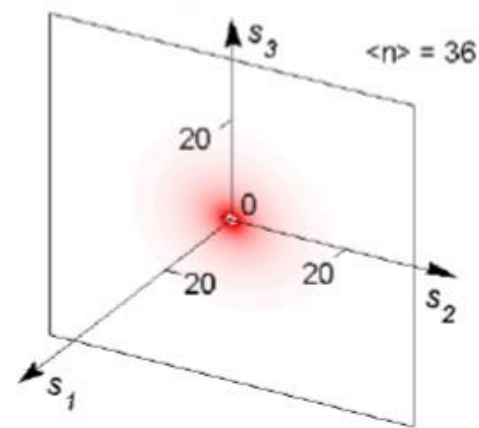
### Два лазерных пучка различной линейной поляризации



### Тепловое состояние света

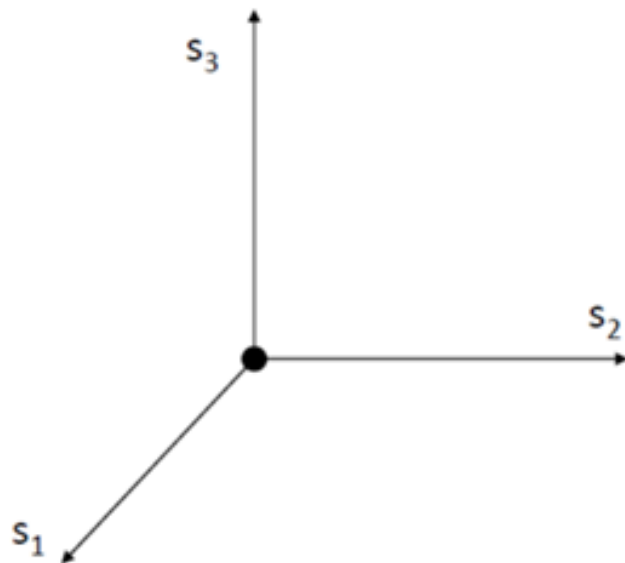


### XU-бифотонный свет



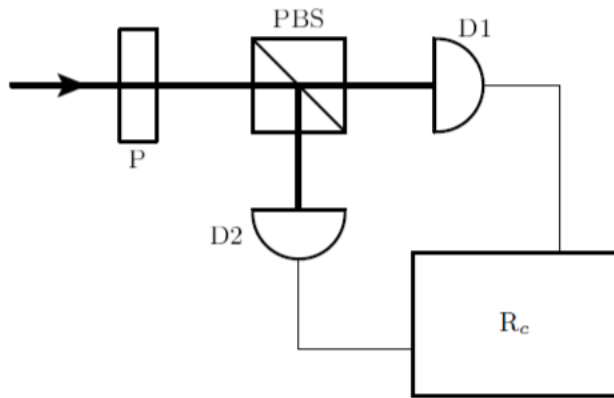
# Поляризационно-скалярный свет

$$W(s_1, s_2, s_3) = \delta(s_1, s_2, s_3)$$



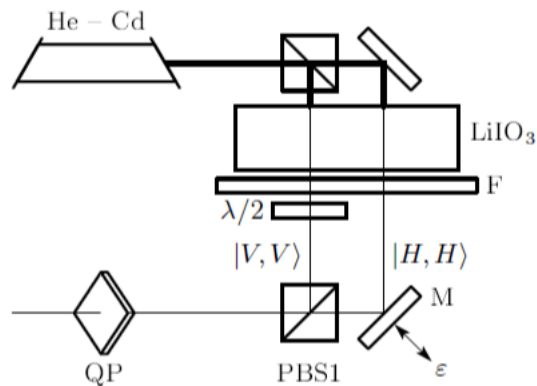
Карасев В.П., Масалов А.В. *Оптика и Спектроскопия* 74, 928 (1993)





$$|\Phi^-\rangle = \frac{1}{\sqrt{2}}(|H_\omega H_{\omega'}\rangle - |V_\omega V_{\omega'}\rangle)$$

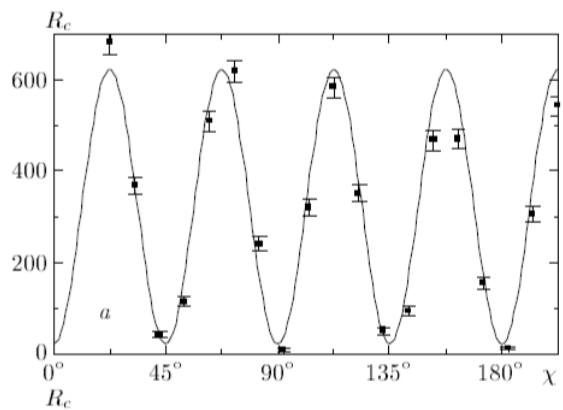
$$|\Phi^+\rangle = \frac{1}{\sqrt{2}}(|H_\omega H_{\omega'}\rangle + |V_\omega V_{\omega'}\rangle)$$



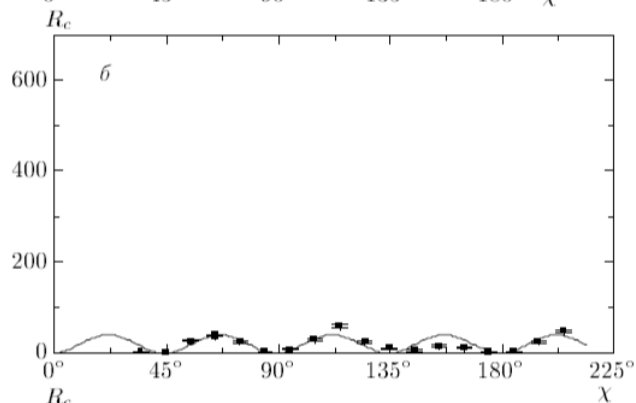
$$|\Psi^-\rangle = \frac{1}{\sqrt{2}}(|H_\omega V_{\omega'}\rangle - |V_\omega H_{\omega'}\rangle)$$

$$|\Psi\rangle = \frac{1}{\sqrt{2}}(|H_\omega H_{\omega'}\rangle + e^{-i\varepsilon}|V_\omega, V_{\omega'}\rangle)$$

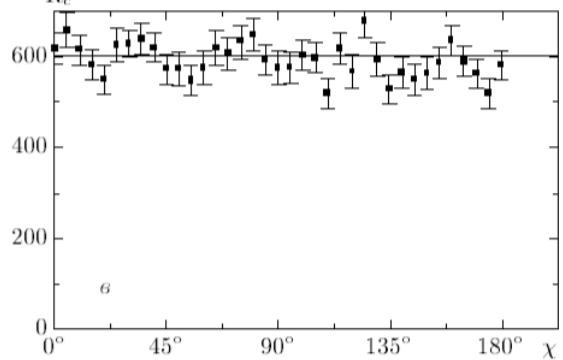
$$|\Phi^-\rangle = \frac{1}{\sqrt{2}}(|H_\omega H_{\omega'}\rangle - |V_\omega V_{\omega'}\rangle)$$

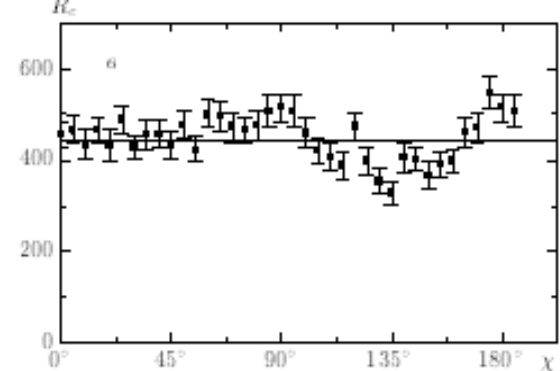
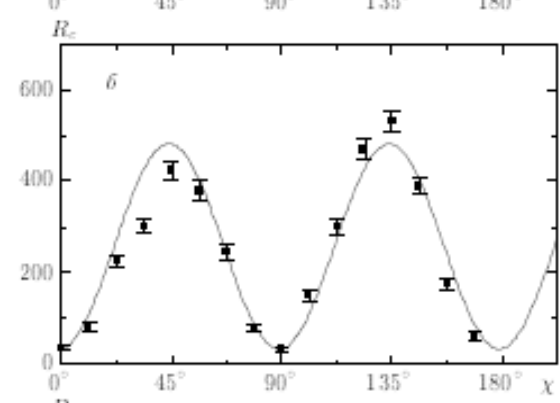
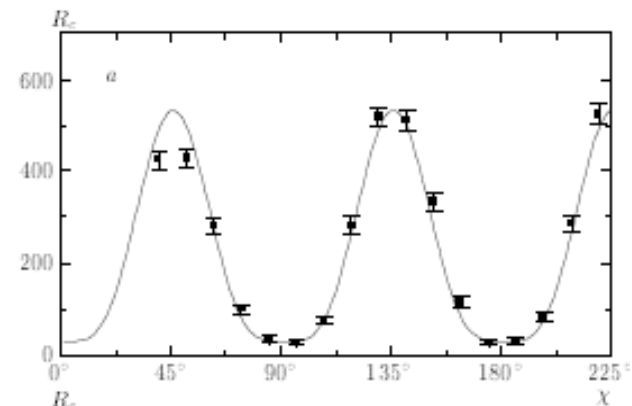


$$|\Phi^+\rangle = \frac{1}{\sqrt{2}}(|H_\omega H_{\omega'}\rangle + |V_\omega V_{\omega'}\rangle)$$



$$|\Psi^-\rangle = \frac{1}{\sqrt{2}}(|H_\omega V_{\omega'}\rangle - |V_\omega H_{\omega'}\rangle)$$



$$\frac{\lambda}{2}$$


$$\frac{\lambda}{4}$$