Polarization transfer coefficients in ^{12}C using inelastic proton scattering at 0° *

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Motivation

- Polarization transfer coefficients (PT) as a tool for the study of spin-isospin structure

- This experiment: Determination of PT coefficients of 0^+ (T=0), 1^+ (T=0,T=1) states in ^{12}C

- Compare with similar experiment at 395 MeV [1]

- Consistency check for a series of experiments performed at 295 MeV

Polarization transfer coefficients
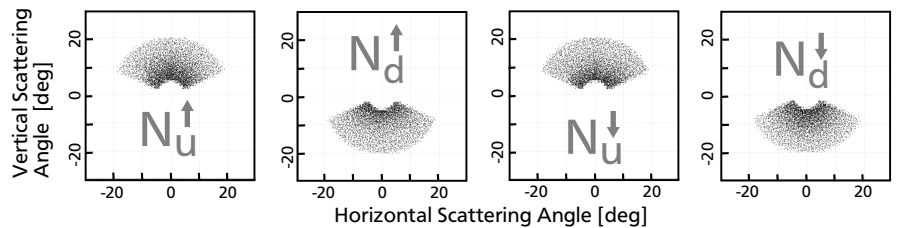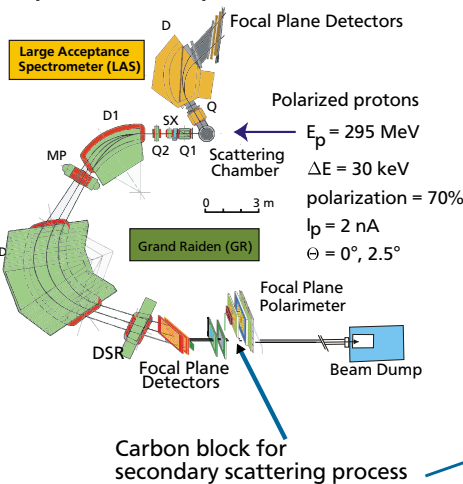
- At 0°: spinflip / non-spinflip separation

- Total spin transfer
$$\sum = \frac{3-(2D_{SS}+D_{LL})}{4} = \begin{cases} 0, & \Delta S = 0 \\ 1, & \Delta S = 1 \end{cases}$$

- $p_x^{fpp} = \dfrac{1}{\langle A_y \rangle^{fpp}} \dfrac{1-\alpha^{fpp}}{1+\alpha^{fpp}}$ with $\alpha^{fpp} = \sqrt{\dfrac{N_u^\uparrow \cdot N_d^\downarrow}{N_d^\uparrow \cdot N_u^\downarrow}}$
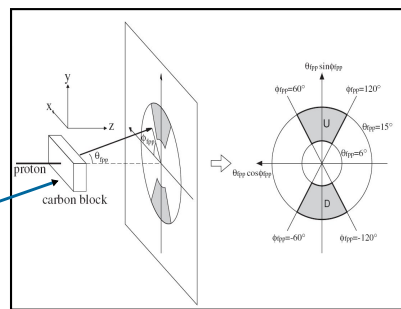
- $p'' = \cos(\theta_p) D_{SS} p_S + \sin(\theta_p) D_{LL} p_L$
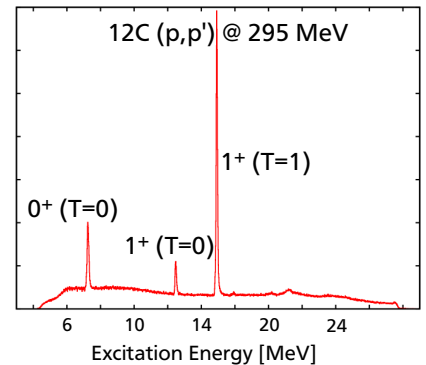
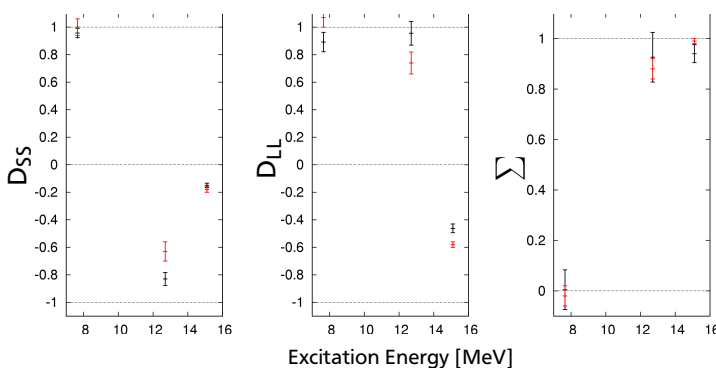## $(\vec{p},\vec{p}')$ Experiments at RCNP Osaka

Experimental setup

Large Acceptance Spectrometer (LAS)
Focal Plane Detectors
D1
SX
Q2 Q1
Q
MP
Grand Raiden (GR)
DSR
Focal Plane Detectors
Focal Plane Polarimeter
Beam Dump
Scattering Chamber

Polarized protons
E_p = 295 MeV
ΔE = 30 keV
polarization = 70%
I_p = 2 nA
Θ = 0°, 2.5°

0   3 m

Carbon block for secondary scattering process

- Polarization transfer determined from asymmetry in secondary scattering

$N_u^\uparrow$ $N_d^\uparrow$ $N_u^\downarrow$ $N_d^\downarrow$

Vertical Scattering Angle [deg]
Horizontal Scattering Angle [deg]

Sector Method

Spectrum

12C (p,p') @ 295 MeV
0^+ (T=0)
1^+ (T=0)
1^+ (T=1)
Excitation Energy [MeV]

First results, summary and outlook

Comparison with 395 MeV experiment

D_{SS} D_{LL} $\sum$
Excitation Energy [MeV]

Summary

- Consistency check of the experimental method. ✓

Outlook

- Study of complete E1 response in ^{120}Sn and ^{208}Pb
  → HK 63.2 (Iryna Poltoratska)
  → HK 63.5 (Anna Maria Heilmann)

- Future Goal: Spin M1 Resonance in the deformed nucleus ^{154}Sm

References

- [1] A. Tamii et al., Phys. Lett. B 459 (1999) 61.

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