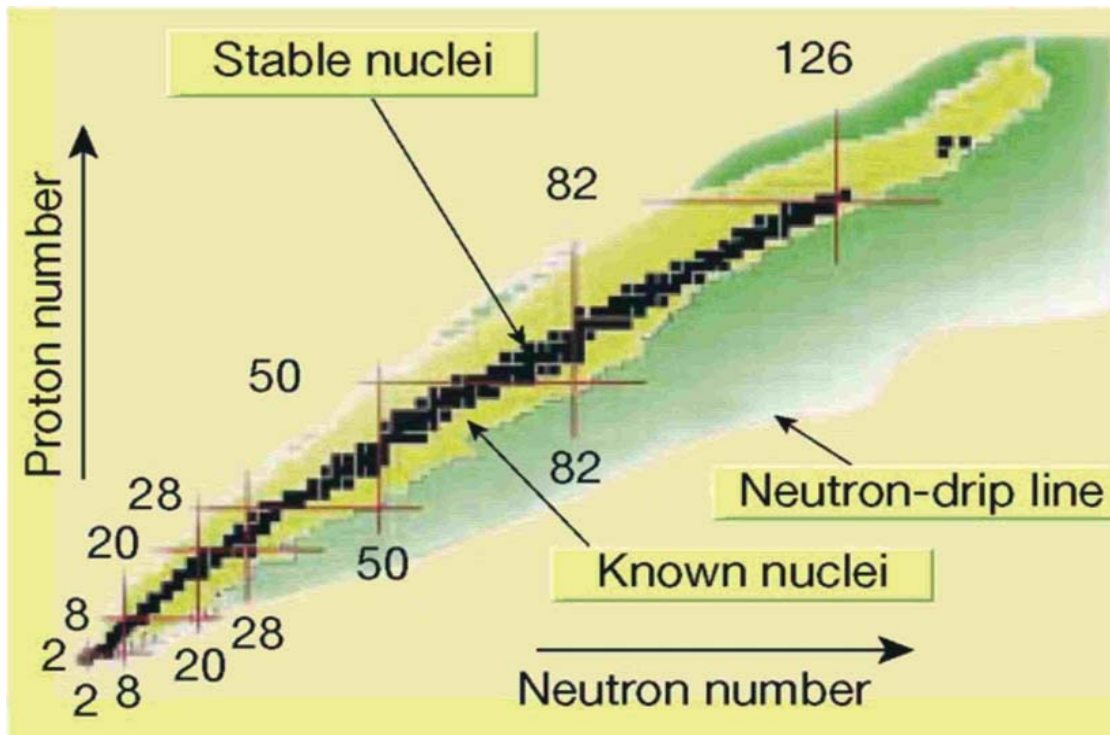


S322: Measurement of one-neutron removal distribution and interaction cross section in the island of inversion around $N=20$ (Spokeperson R. Kanungo)

C. Nociforo
for the S322 collaboration

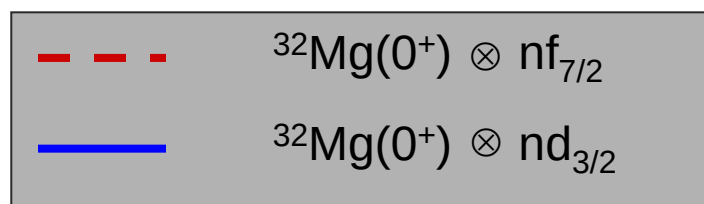
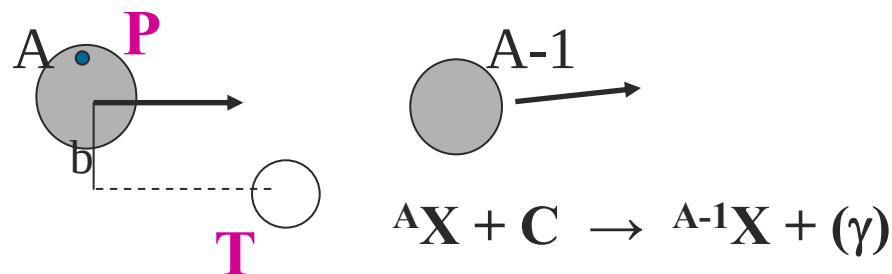
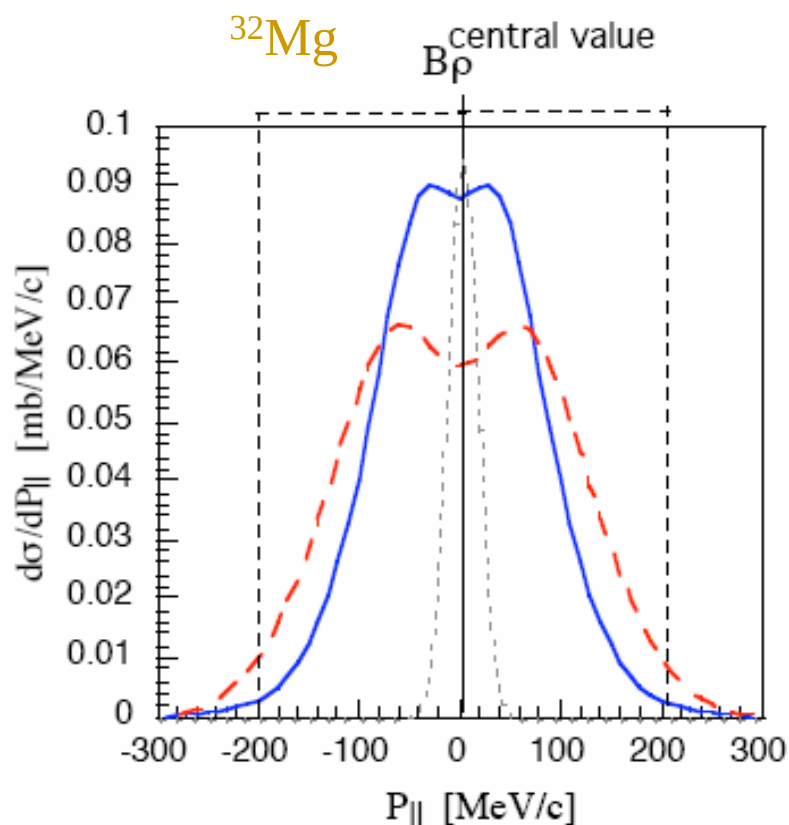


- Change in the shell ordering (**island of inversion**) in the Magnesium region ($N=20$)
- Disappearance of magic number $N=20$ ($N=16$ new shell gap)

Sensitivity of $p_{||}$ distributions

e.g. ^{33}Mg

Knockout reactions are suitable to probe the shell structure



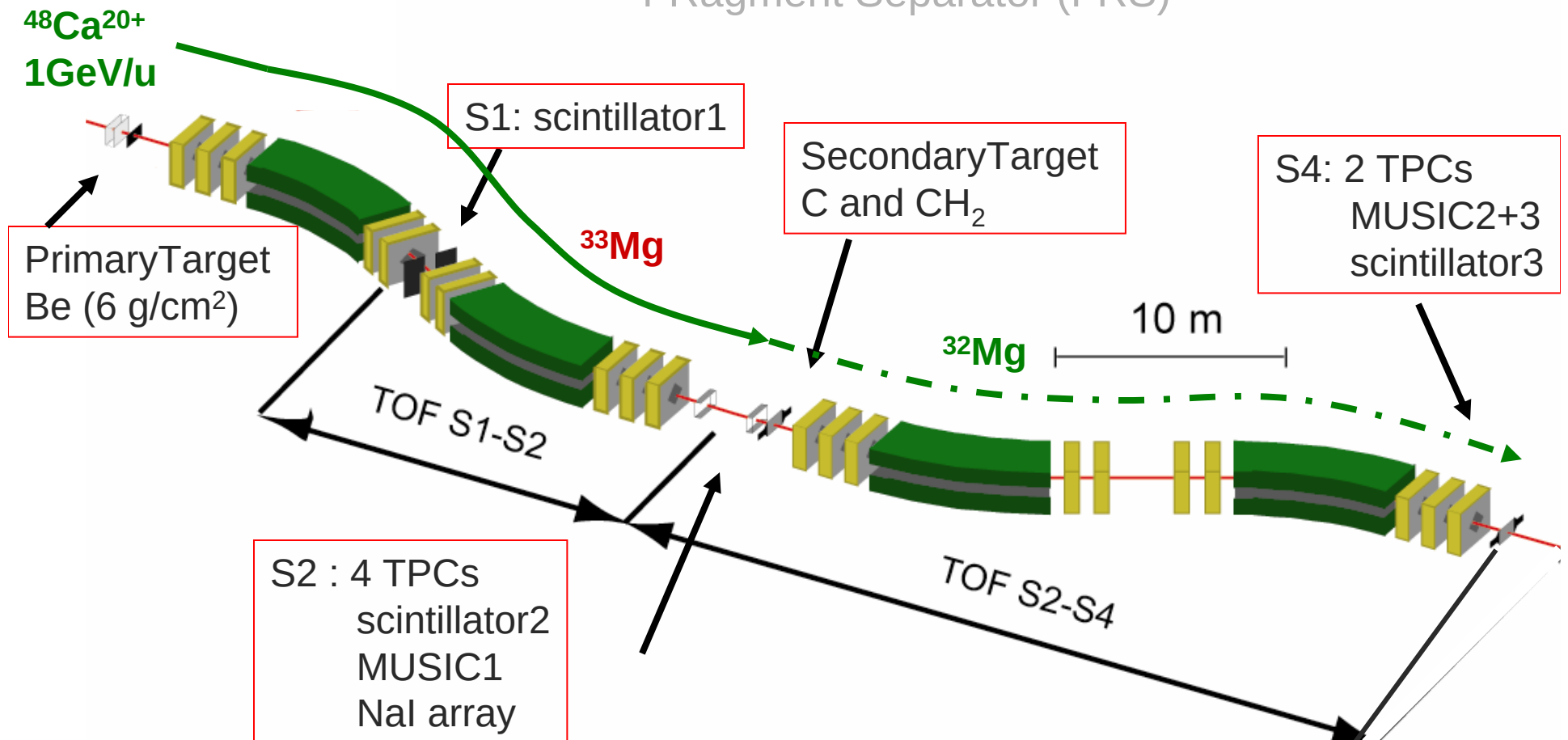
- Shape of $d\sigma/dp_{||}$ of the residual nucleus
→ l_n of the knocked out nucleon
- Cross section σ_{-1n} → spectroscopic factors

Calculations by R. Kanungo (eikonal model)

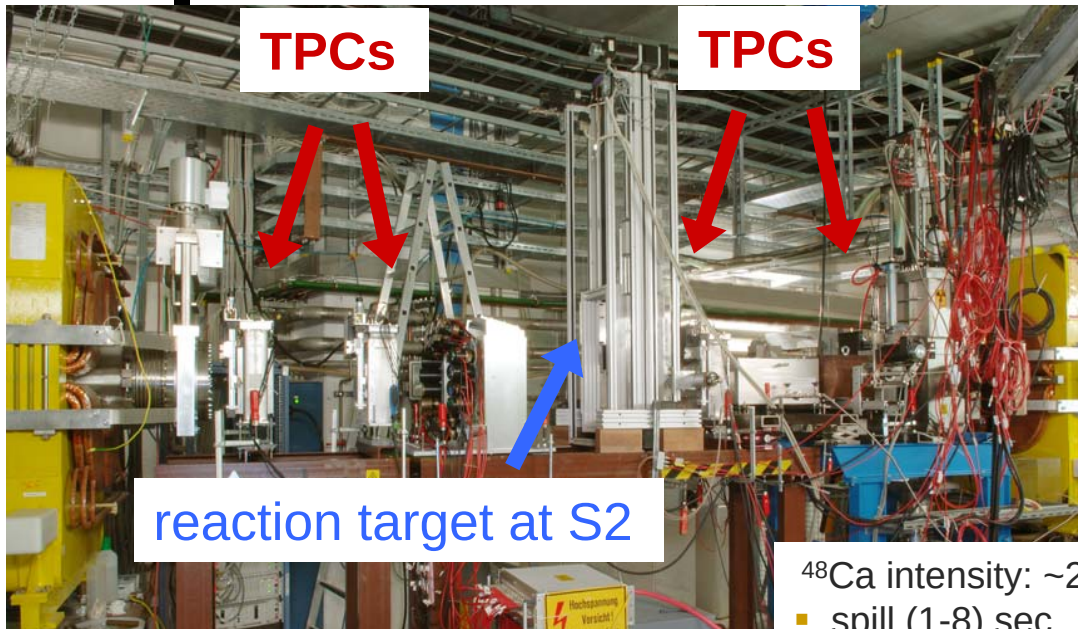
S322 experimental setup

Other investigated systems around ^{24}O (new doubly magic?) and ^{34}Al

FRagment Separator (FRS)



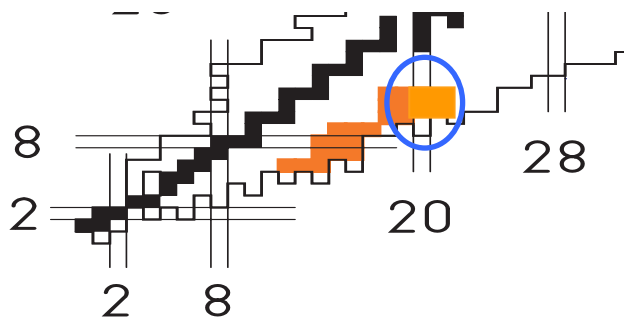
Tracking detectors at the FRS



High-resolution momentum measurements ($\sim 1.5 \cdot 10^{-4}$) in knockout reactions

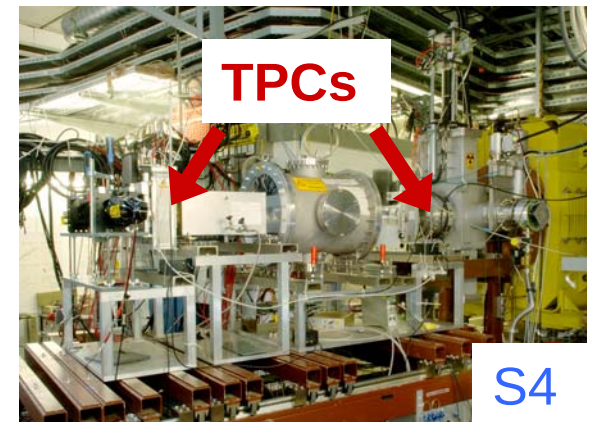
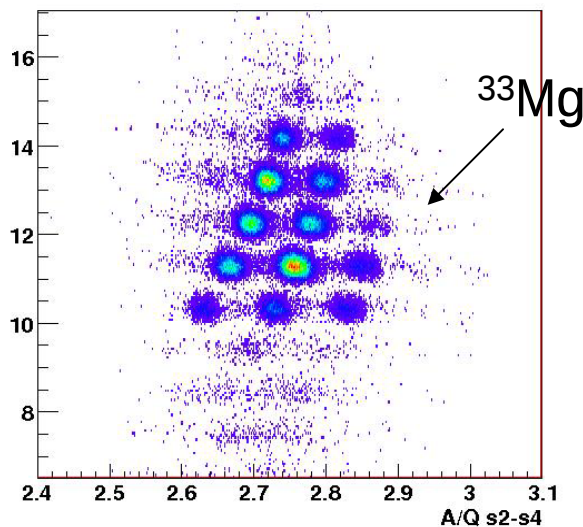


Interaction cross-section measurements in the *Island of Inversion* @ 1GeV/u



^{48}Ca intensity: $\sim 2 \cdot 10^9/\text{spill}$

- spill (1-8) sec
- multi-injection mode (SIS18)



- S1 total rate : $4 \cdot 10^4/\text{s}$
- ^{33}Mg rate at S2 : $\sim 40/\text{s}$
- max. trigger rate : $10^3/\text{s}$ (low Z rejection)

Rate limitation due to pile-up in the Music at S2

(pile-up rejection by trigger selection)

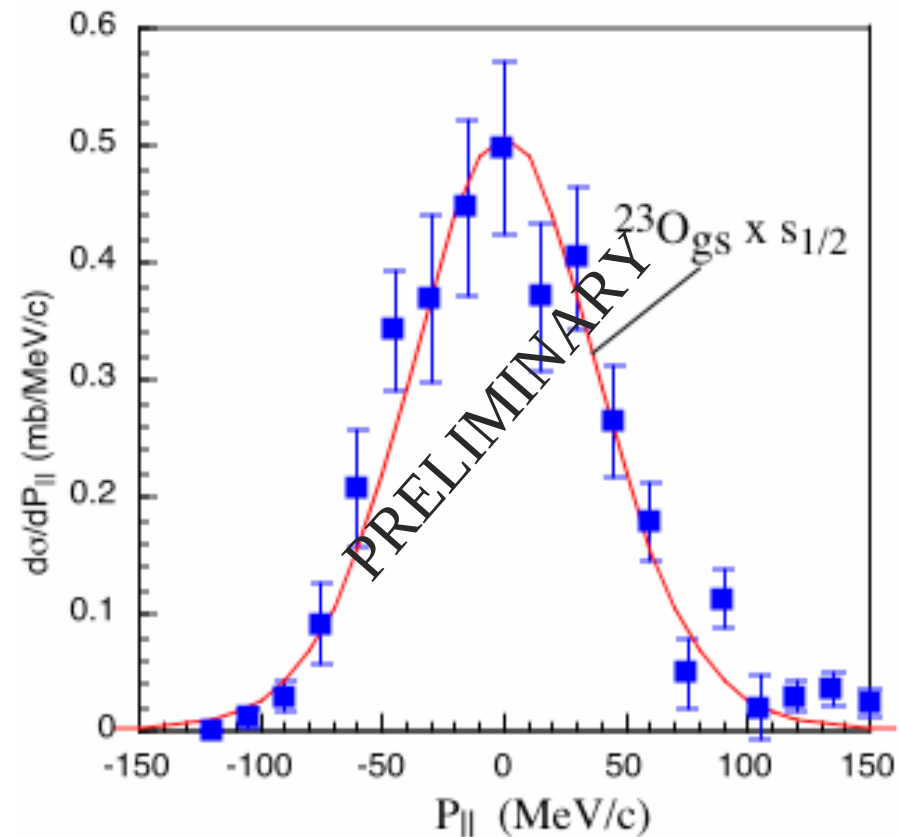
^{24}O one-neutron removal reaction @ 920 MeV/u

After PID selection

$$P_f^{lab} = \left(1 + \frac{x_4 - Mx_2}{D_{24}}\right) z_f B\rho$$

Dominant s-wave suggests ^{24}O to be a new doubly closed shell nucleus

$$P_{||} = \gamma_b(P_f^{lab} - \beta_b E_f^{lab})$$



Collaborators

R. Kanungo, C. Nociforo, A. Prochazka, D. Acker, T. Aumann, K-H. Behr, A. Bruenle, D. Boutin, D. Cortina-Gil, B. Davids, M. Diakaki, F. Farinon, H. Geissel, R. Gernhaeuser, J. Gerl, W. Hueller, R. Janik, C. Karagiannis, B. Kindler, R. Knoebel, R. Kruecken, N. Kurz, M. Lantz, H. Lenske, Y. Litvinov, B. Lommel, K. Mahata, P. Maierbeck, A. Musumarra, T. Nilsson, C. Perro, C. Scheidenberger, B. Sitar, P. Strmen, B. Sun, I. Szarka, I. Tanihata, H. Weick, M. Winkler, I. Wischert

