

# Polarized beams at HIE-ISOLDE – from dreams to reality.

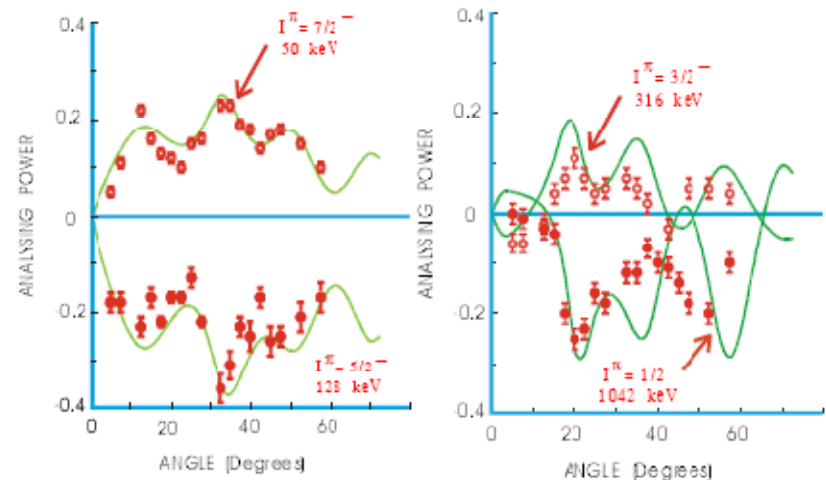
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## Polarized beams – WHY?

Precise test of the nuclear models for exotic nuclei:

- transfer reactions  $\rightarrow j = l \pm \frac{1}{2}$  (analyzing power)
- **Coulomb excitation** – spin/parity; multiplicity assignments etc.
- **nuclear moments** – proton/neutron character, angular momentum  $j$



$$A_y = \frac{\left(\frac{d\sigma}{d\Omega}\right)_{\uparrow} - \left(\frac{d\sigma}{d\Omega}\right)_{\downarrow}}{\left(\frac{d\sigma}{d\Omega}\right)_{\uparrow} p_{\downarrow} + \left(\frac{d\sigma}{d\Omega}\right)_{\downarrow} p_{\uparrow}}$$

# Can one do it and how?

Tilted Foils - the principles:

- atomic polarization  $\rightarrow$  nuclear polarization
- higher nuclear spins  $\rightarrow$  higher polarization (>10% achieved so far)
- strong velocity dependence (poorly studied up to now)

345

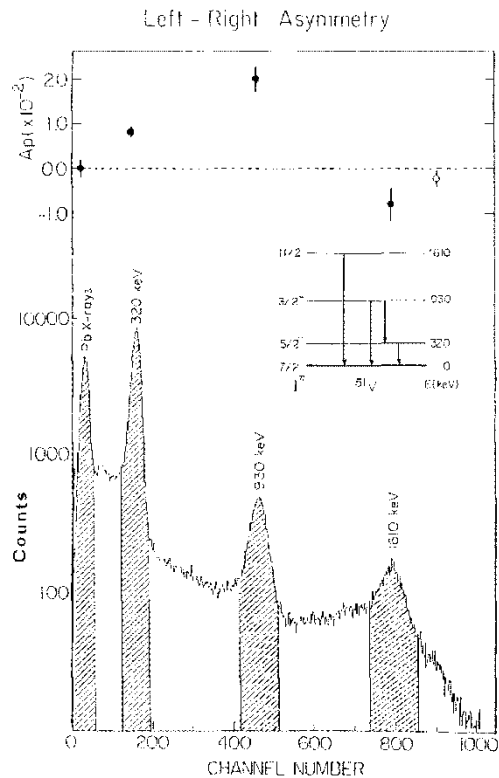
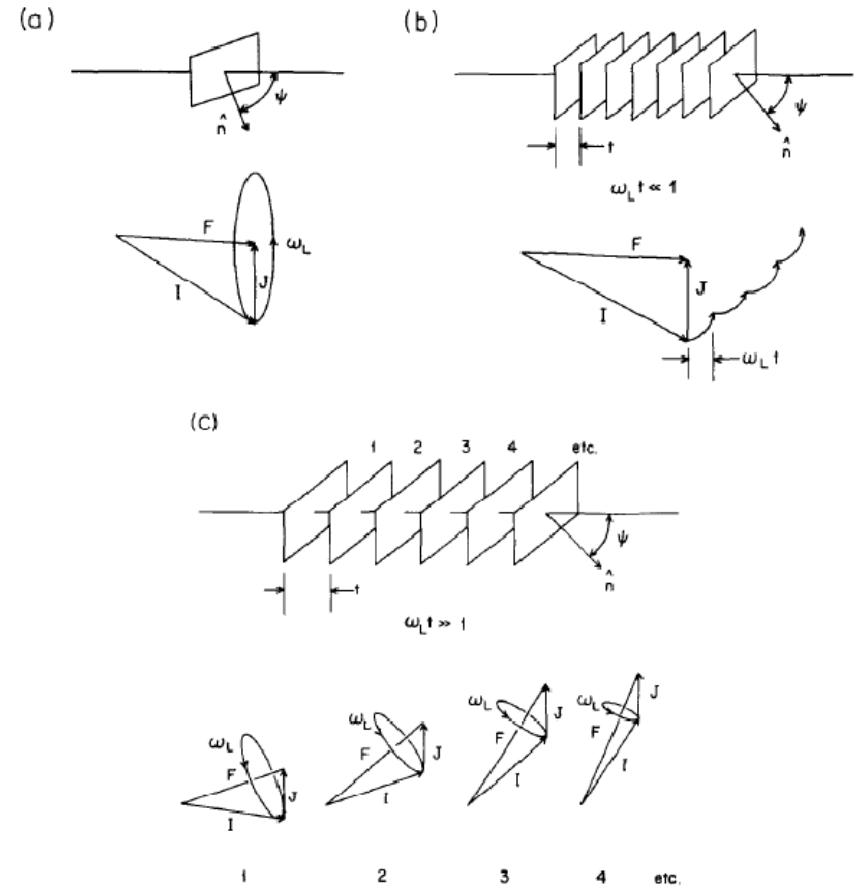


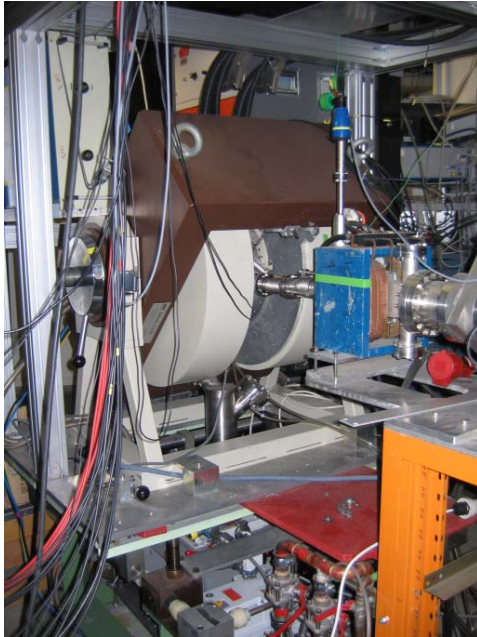
Fig. 3. Left-right asymmetry of the Coulomb excited  $^{51}\text{V}$  on  $^{208}\text{Pb}$  at 195 MeV for the three main decay  $\gamma$ -rays, Pb x-rays and  $\gamma$ -particle random coincidences (open circle)



M. Hass et al., NPA 414, 316 (84)

- Can one **post-accelerate** the ions after polarizing them?  
done for stable beams - **noble-gas like charge states** + LINAC  
 $\leftarrow$  J. Bendahan *et al.*, ZPA 331, 343 (88)

# What do we need to achieve it?



$\beta$ -NMR setup from HMI Berlin transferred to ISOLDE

- gain of complete control on the TF polarization
- **nuclear structure** (moments, reactions ...),  
nuclear methods in the **solid-state physics**,  
**biophysics** etc. ...

## REX-ISOLDE - unique opportunity

