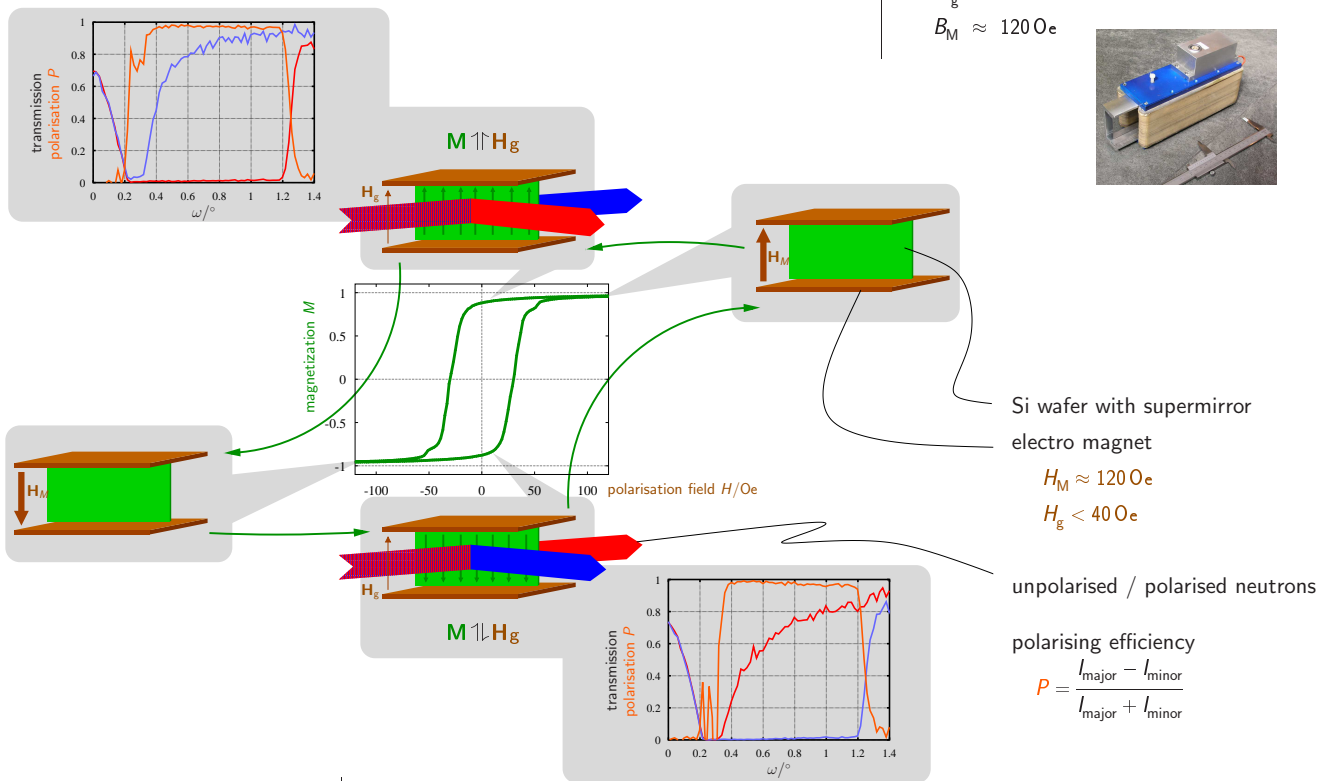


A switchable white-beam neutron polariser

- Aim:** a polariser / analyser which
- does not alter the beam path
 - accepts a wide bandwidth / divergence
 - does not interfere with the sample environment (no stray fields)
 - provides both spin states (without a flipper)
- Approach:** Fe/Si supermirror (SM) on Si (deposited by magnetron sputtering) [1, 2]
- Advantages:** magnetic hysteresis allows for switching [3]
no magnetic fields (besides guide field H_g) [4]
reflection and transmission mode possible
- Disadvantages:** q -range is limited by the stability of the coating
⇒ only $m = 3$ with 600 layers is reachable [a]

operation principle for a remanent polariser



future projects

- analyser for the TOF reflectometer AMOR (switchable; usable in reflectometry and transmission mode simultaneously);
- compact polariser ($\approx 10 \text{ cm}$ [?]) for beamwidths $> 1 \text{ cm}$;
- improvement of the mechanical stability of the coating to allow for $m > 3$.

references

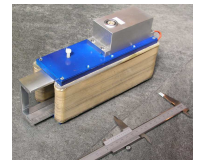
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[3] F. Semadeni, B. Roessli, P. Böni: *Physica B* **297**, 152–154 (2001)
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[a] m is a measure for the critical angle θ_{SM}^c relative to Ni: $\theta_{SM}^c := m \theta_{Ni}^c$

applications

- V-shaped polariser [5] for SANS I
not yet switchable
 $P_T \approx 93\% @ 5 \text{ \AA}, 5 \text{ m}$
 $\approx 95\% @ 5 \text{ \AA}, 15 \text{ m}$
 $\approx 98\% @ 8 \text{ \AA}, 15 \text{ m}$
 $B_g \approx 20 O_e$

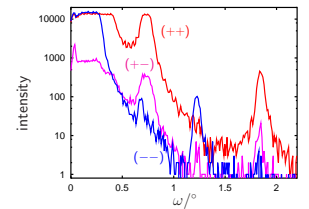
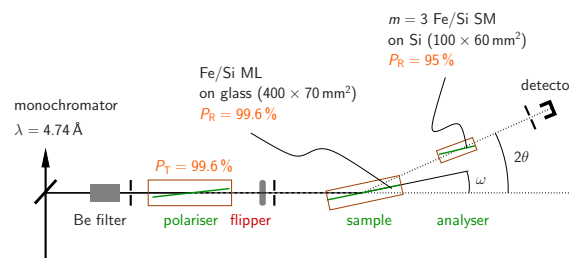


- Switchable spin analyser for the 2 axes diffractometer TOPSI
 $m = 3 \text{ Fe/Si SM on Si}$
 $P_T \approx 96\%$, $M \uparrow \parallel H_g$
 $P_T \approx 95\%$, $M \uparrow \perp H_g$
 $B_g \approx 16 O_e$
 $B_M \approx 120 O_e$



set-up for transmission and reflectivity measurements

Lay-out of the two axes spectrometer TOPSI @ SINQ



Reflectivity curves of a $[\text{Fe}(80 \text{ \AA})/\text{Si}(80 \text{ \AA})]_{10}$ multilayer: $I_{-} = 2.4\% I_{++} + 3.1\% I_{-}$ (caused by the efficiencies of the analyser and of the spin-flipper).

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