

SEMSANS

Spin-Echo Modulated Small Angle Neutron Scattering

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September 20, 2013



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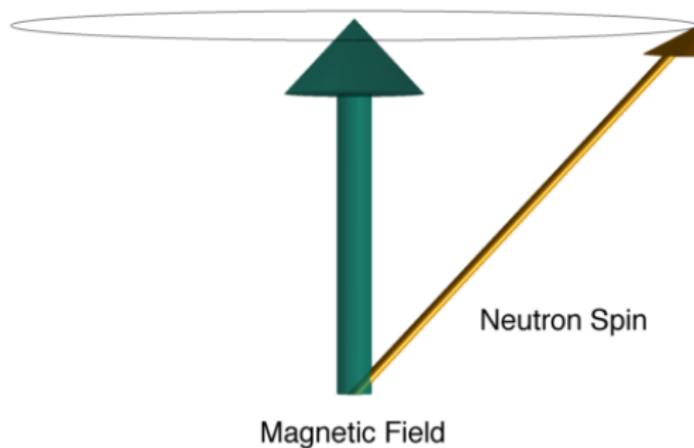
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Introduction

- SEMSANS is a polarised neutron scattering technique using Larmor precession labelling to measure SANS signal.
- Useful for investigation materials at length scales from few nm up into the μm range.
- Low collimation restrictions.
- Can measure magnetic samples or samples in magnetic environment.
- Our investigation includes measurements (performed @RID) and simulations (McStas 2.0, some through iFit in MatLab).

Larmor precession

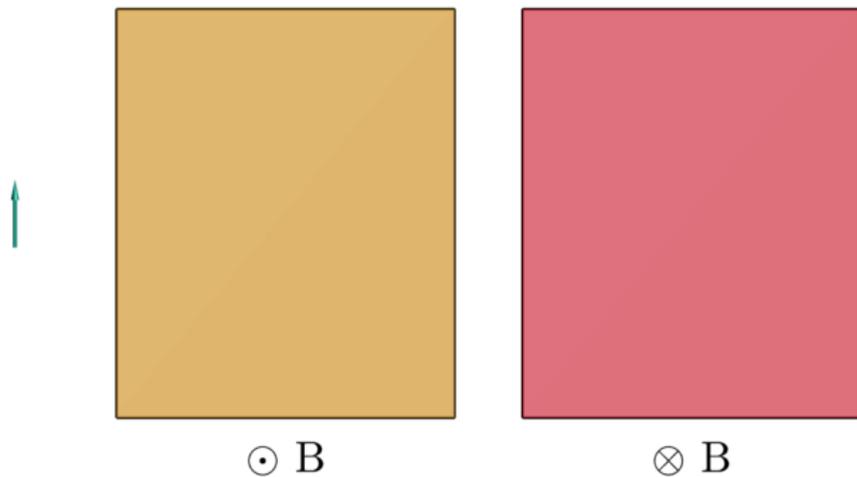


$$\phi \propto Bt$$

Larmor precession

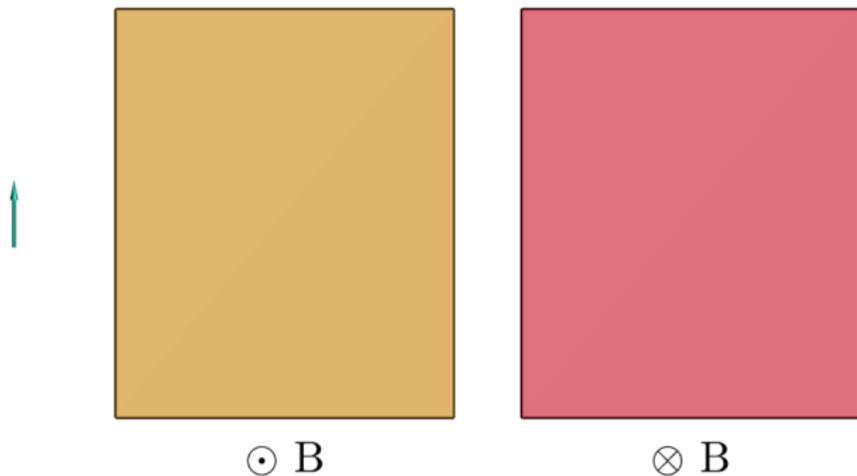
$$\phi \propto Bt$$

Spin-Echo



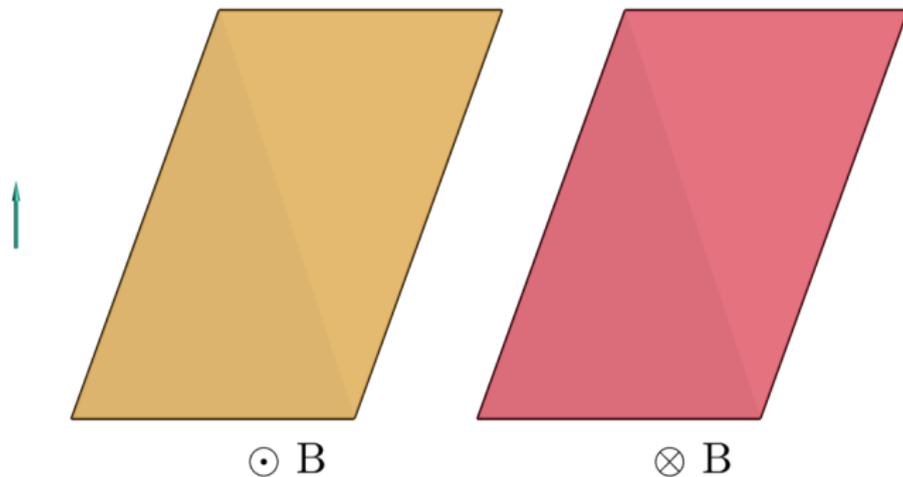
Spin-Echo

Spin-Echo



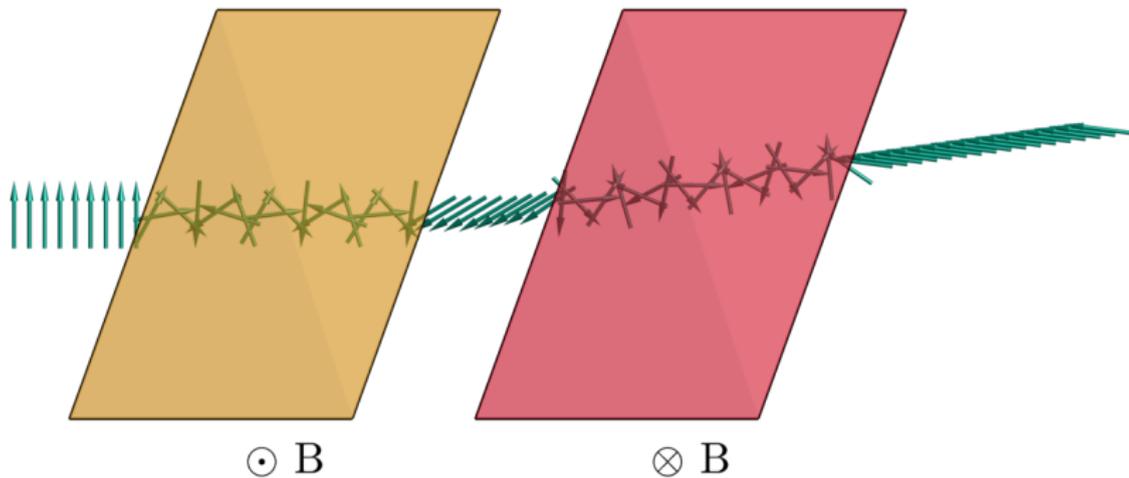
Spin-Echo

SESANS

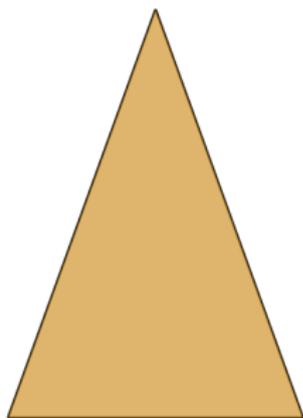


SESANS

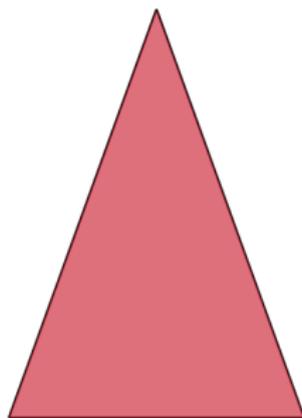
SEMSANS



SEMSANS



$\odot B$

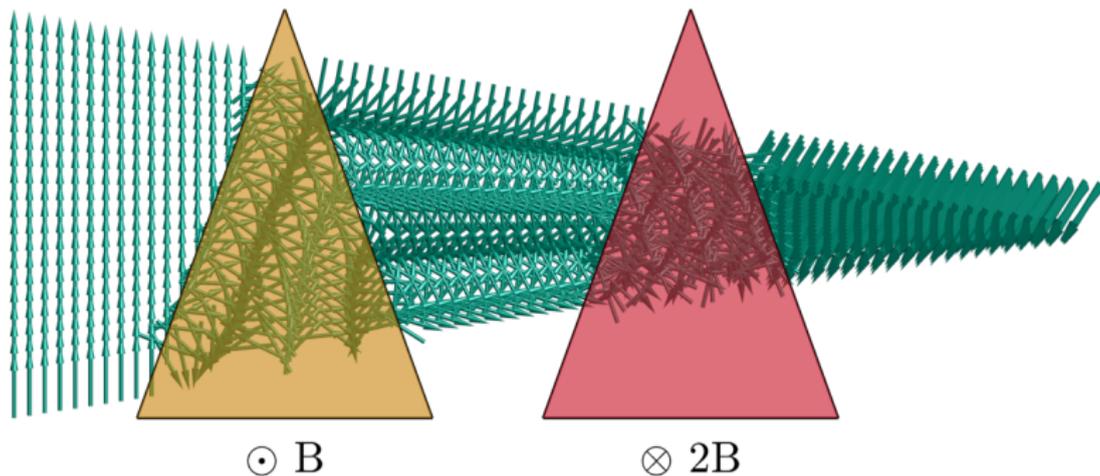


$\otimes 2B$

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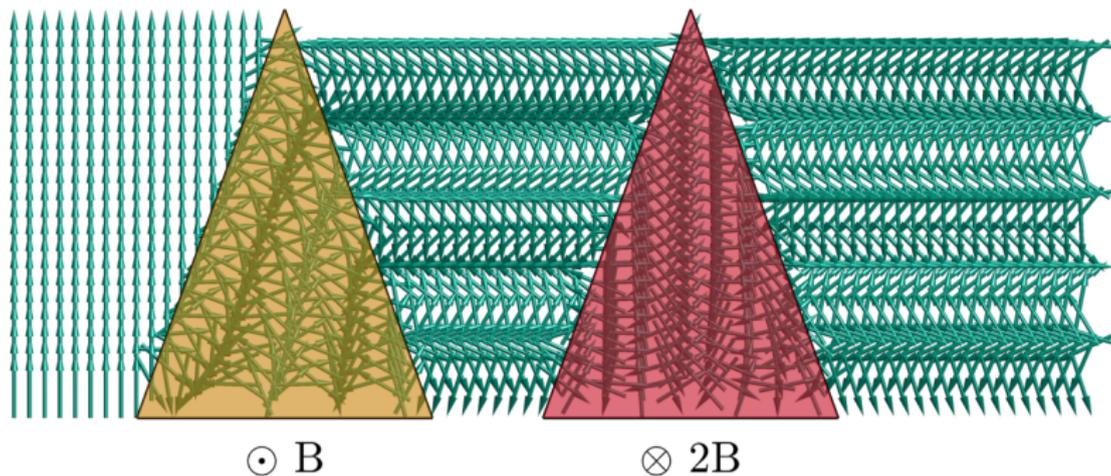
$$L_1 B_1 = L_2 B_2$$

SEMSANS



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SEMSANS

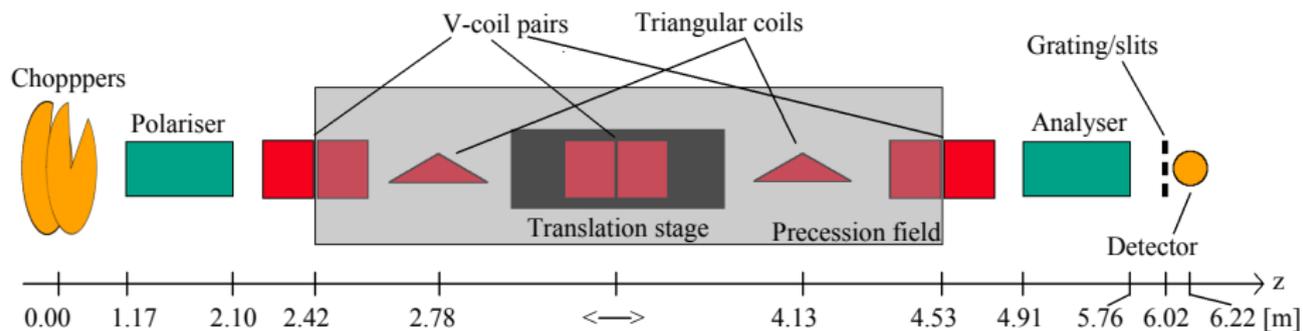


$$L_1 B_1 = L_2 B_2$$

$$\zeta = \frac{\pi \tan \theta_0}{c\lambda (B_2 - B_1)}$$

B_1 [mT]	B_2 [mT]	ζ (mm)	λ [Å]
1.75	3.00	4.2	4.70
		7.5	2.63
2.56	4.44	4.2	3.13
		7.5	1.75

Set-up

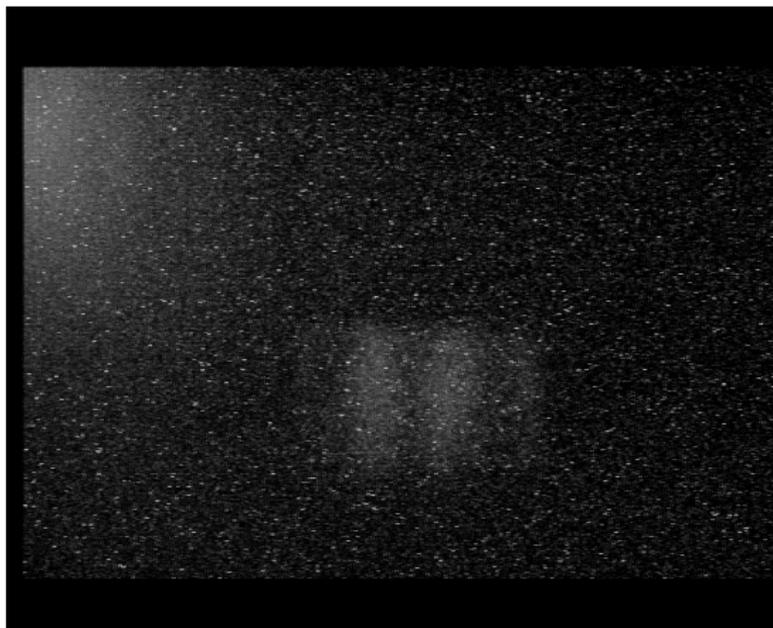


Set-up

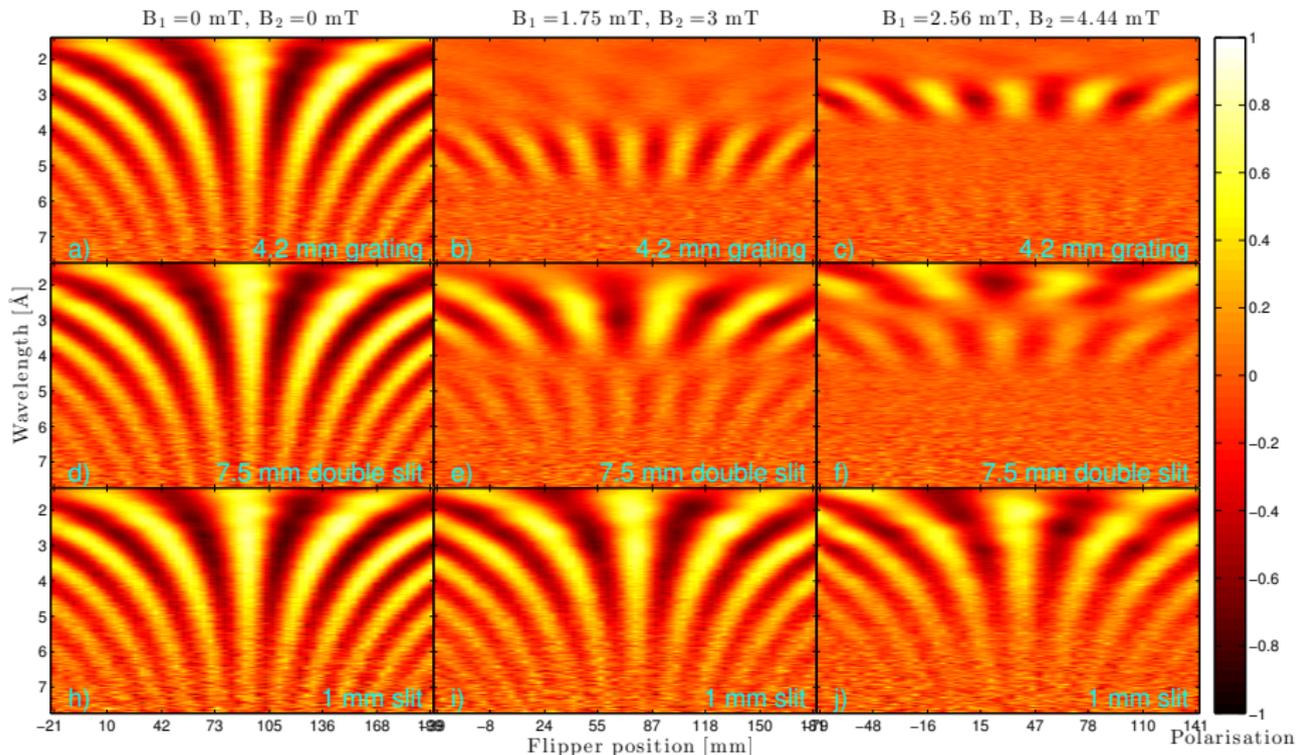


field component was writing by ourselves using simple geometry.

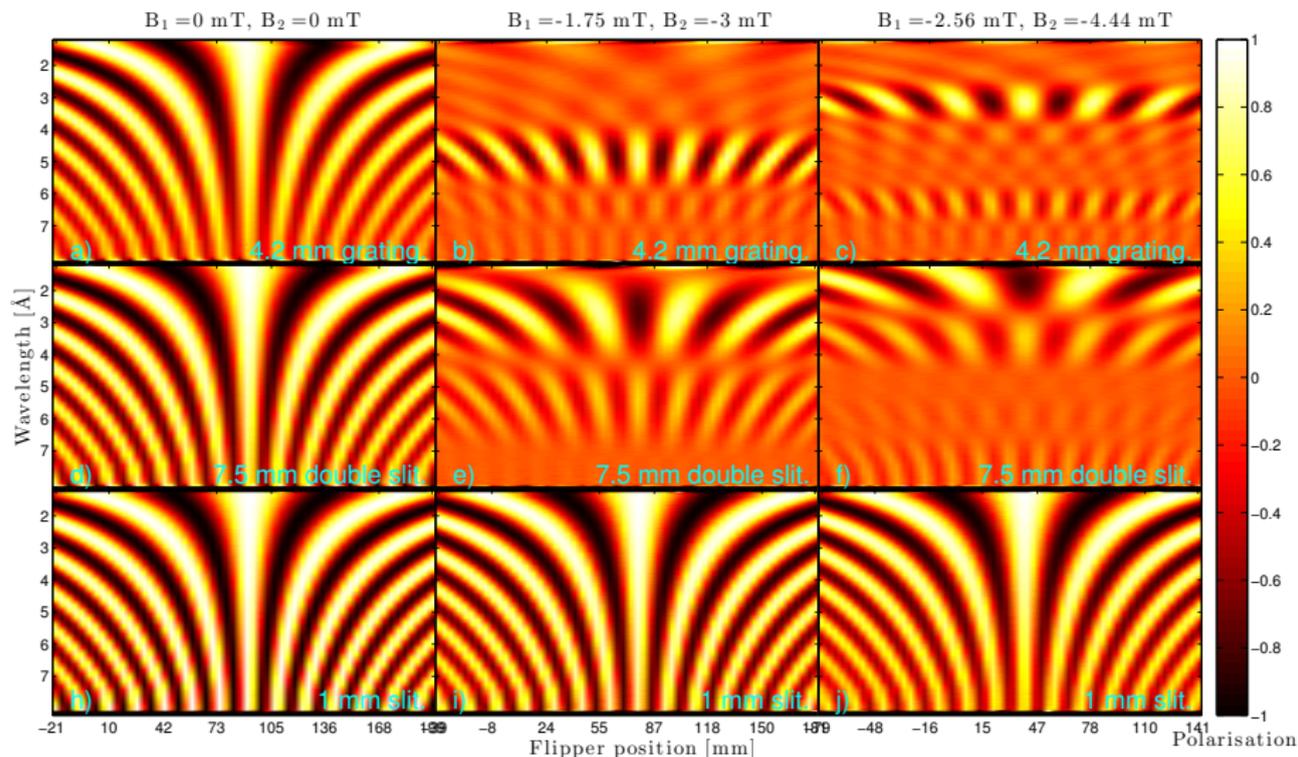
Measurements



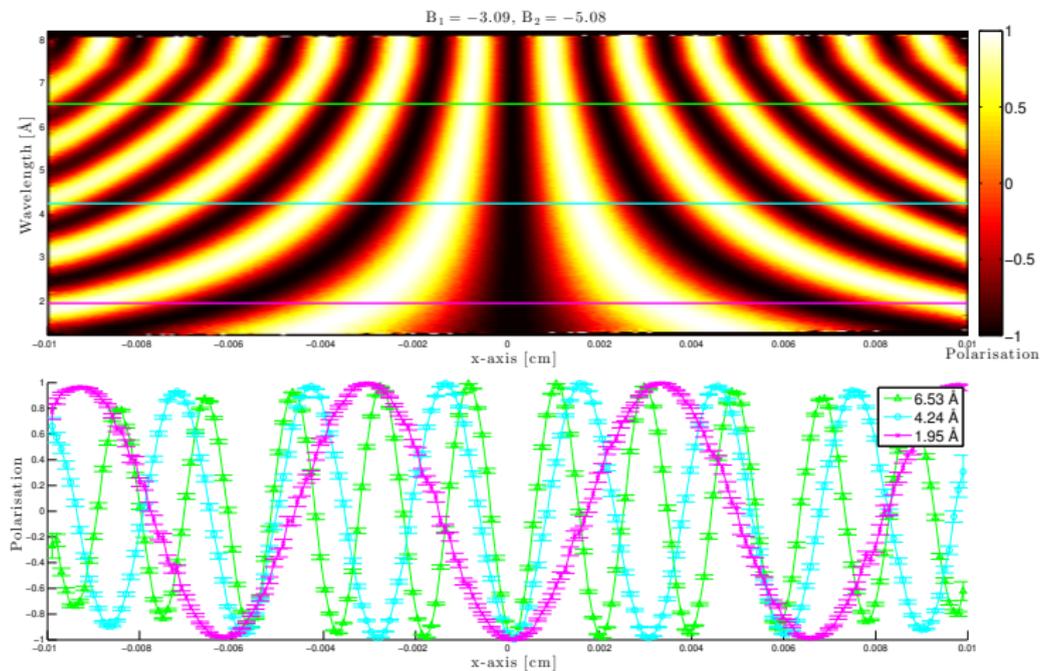
Measurements



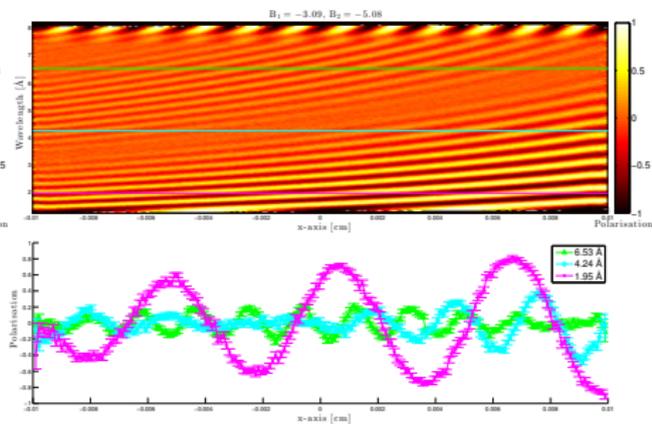
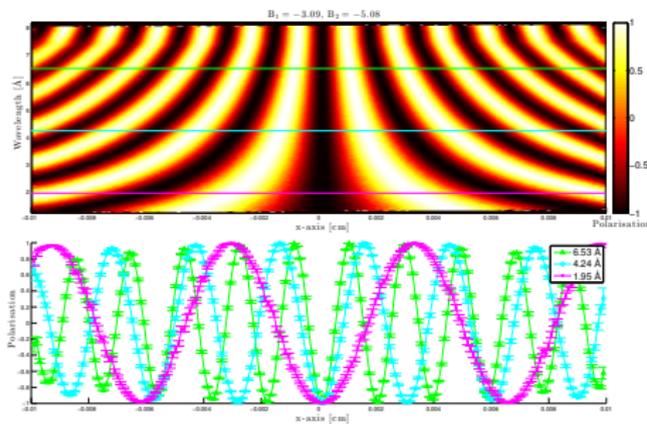
Simulation



Simulation



Simulation



Further investigation

Further investigation

Thanks for listening, and thanks to:

- Jeroen Plomp (RID, TUD)
- Klaus Habicht (HZB)
- Kim Lefmann (NBI, KU)
- Markus Strobl (ESS)
- Marcus Trapp (HZB)
- Wim Bouwman (RID, TUD)
- Anton Tremsin (SSL, UC)

This research project has been supported by the European Commission under the 7th Framework Programme through the 'Research Infrastructures' action of the 'Capacities' Programme, Contract No: CP-CSA-INFRA-2008-1.1.1 Number 226507-NMI3.