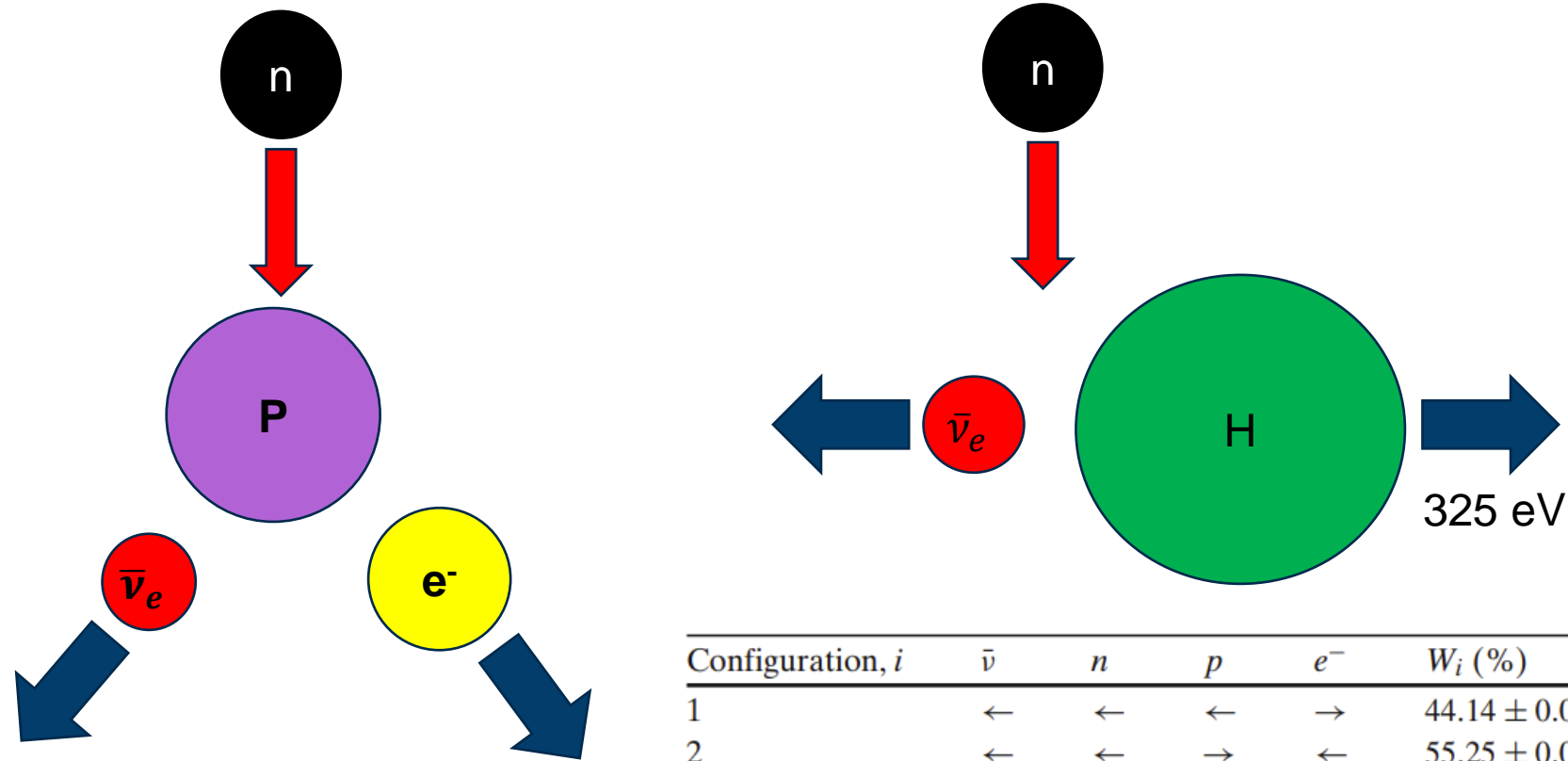


MEASUREMENT OF THE OCCUPATION NUMBER OF METASTABLE ATOMS IN THE HYPERFINE-SUBSTATE β_3 IN AN ATOMIC HYDROGEN BEAM

26.09.2022 | MORITZ WESTPHAL

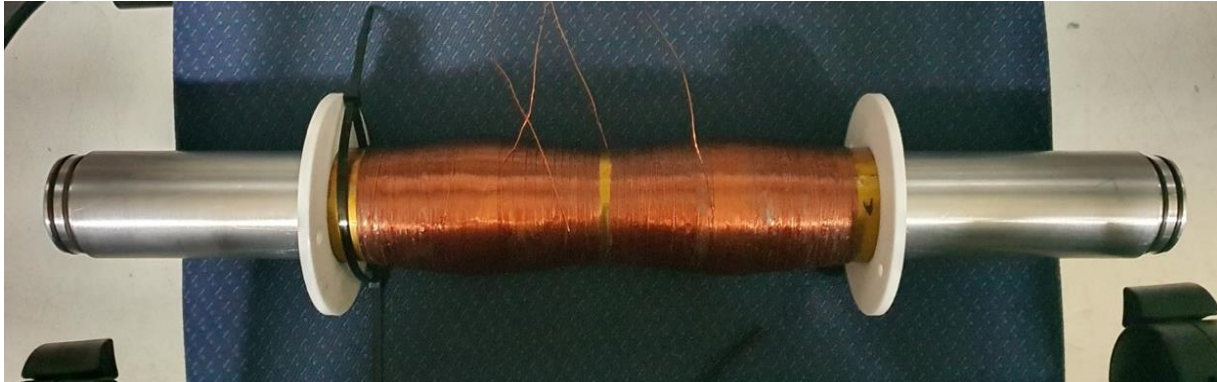
MOTIVATION: NEUTRON BOUND BETA DECAY (BOB)



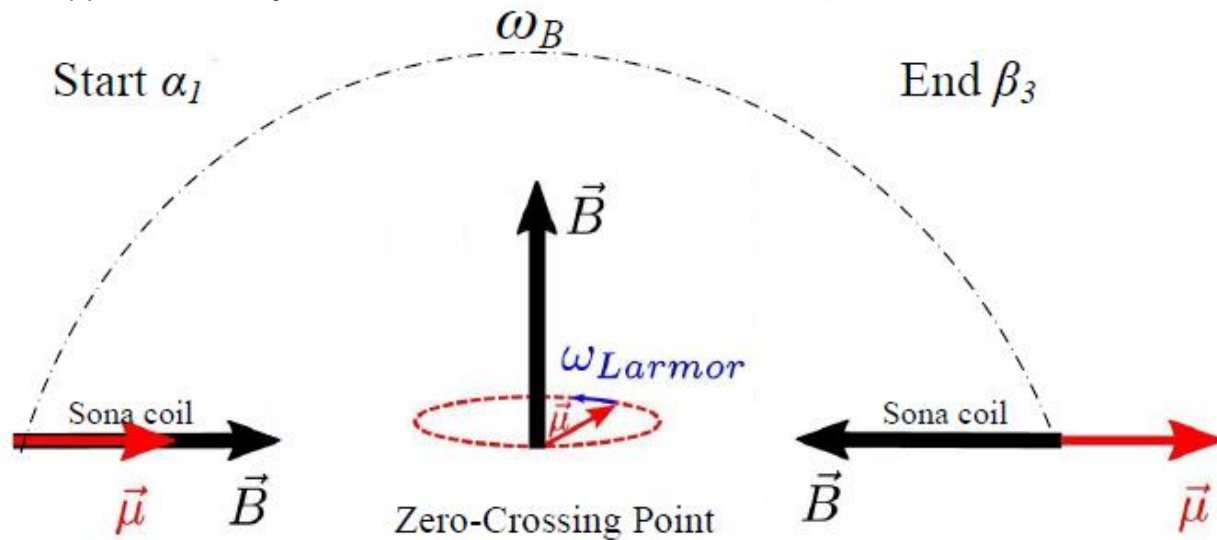
Configuration, i	$\bar{\nu}$	n	p	e^-	W_i (%)	F	m_F	$ m_s m_l\rangle$	HFS
1	←	←	←	→	44.14 ± 0.05	0,1	0	$ +-\rangle$	α_2
2	←	←	→	←	55.25 ± 0.04	0,1	0	$ --\rangle$	β_4
3	←	→	→	→	0.622 ± 0.011	1	1	$ ++\rangle$	α_1
4	→	←	←	←	0.0	1	-1	$ --\rangle$	β_3
2'	→	→	→	←	0.0	0,1	0	$ --\rangle$	β_4
1'	→	→	←	←	0.0	0,1	0	$ +-\rangle$	α_2

Neutron bound beta-decay: BOB *Hyperfine Interact* (2012) 210:13–17 DOI 10.1007/s10751-011-0494-2

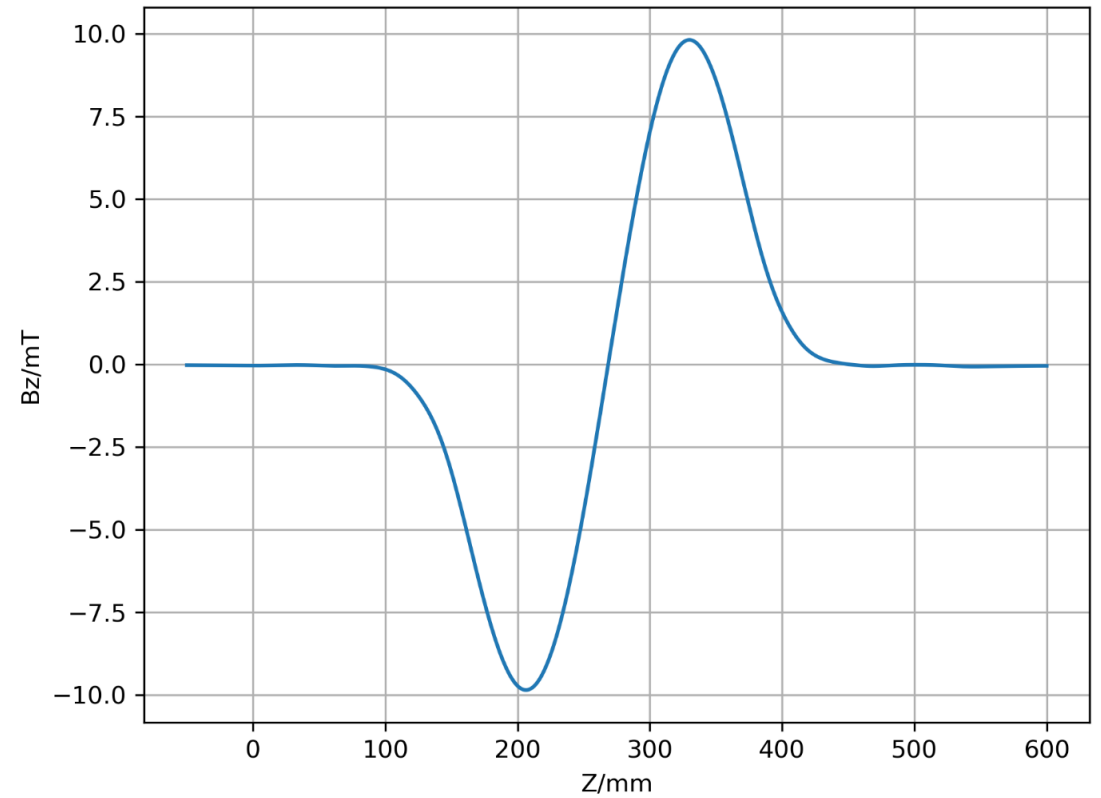
SONA TRANSITION UNIT



Optimization of the magnetic field configuration of a Sona transition unit, Bachelor Thesis, FH Aachen University of Applied Sciences, Sahil Vijaykumar Aswani, August 2022

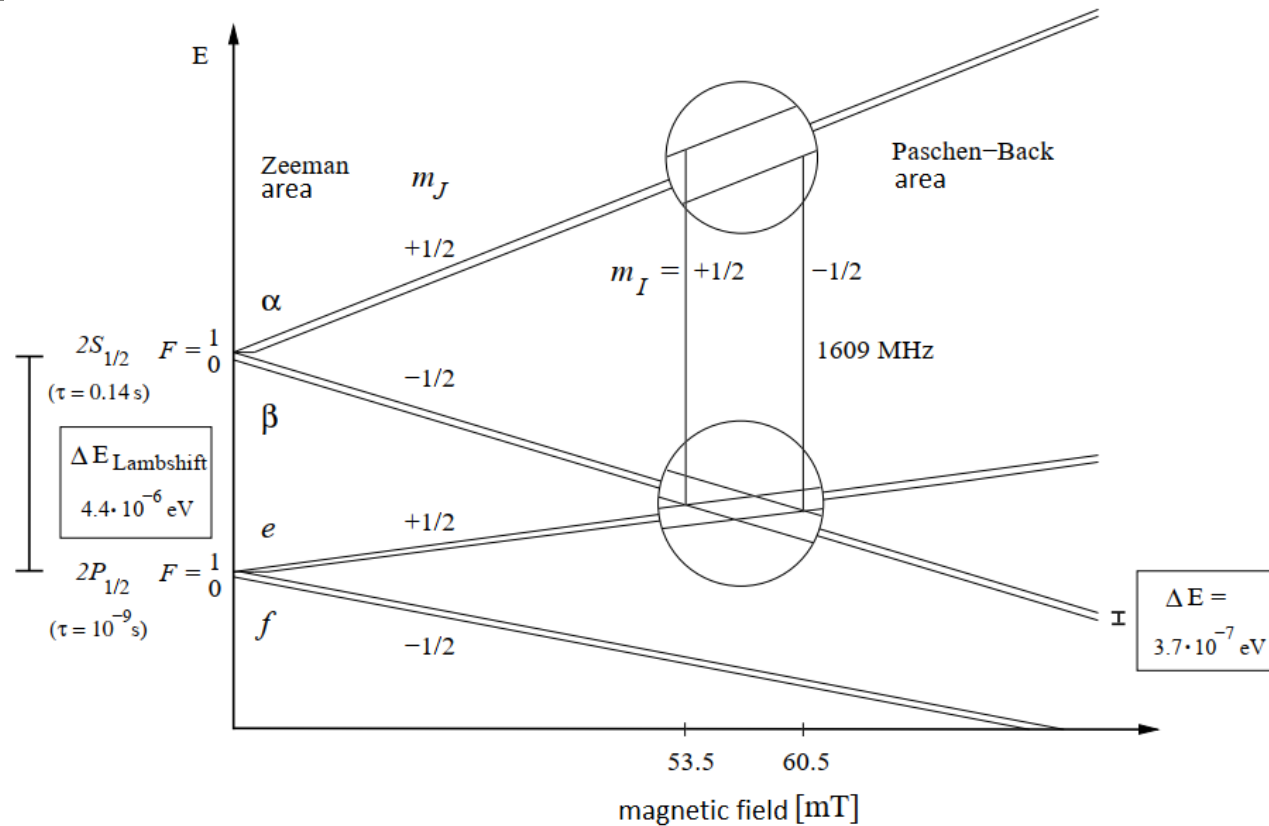
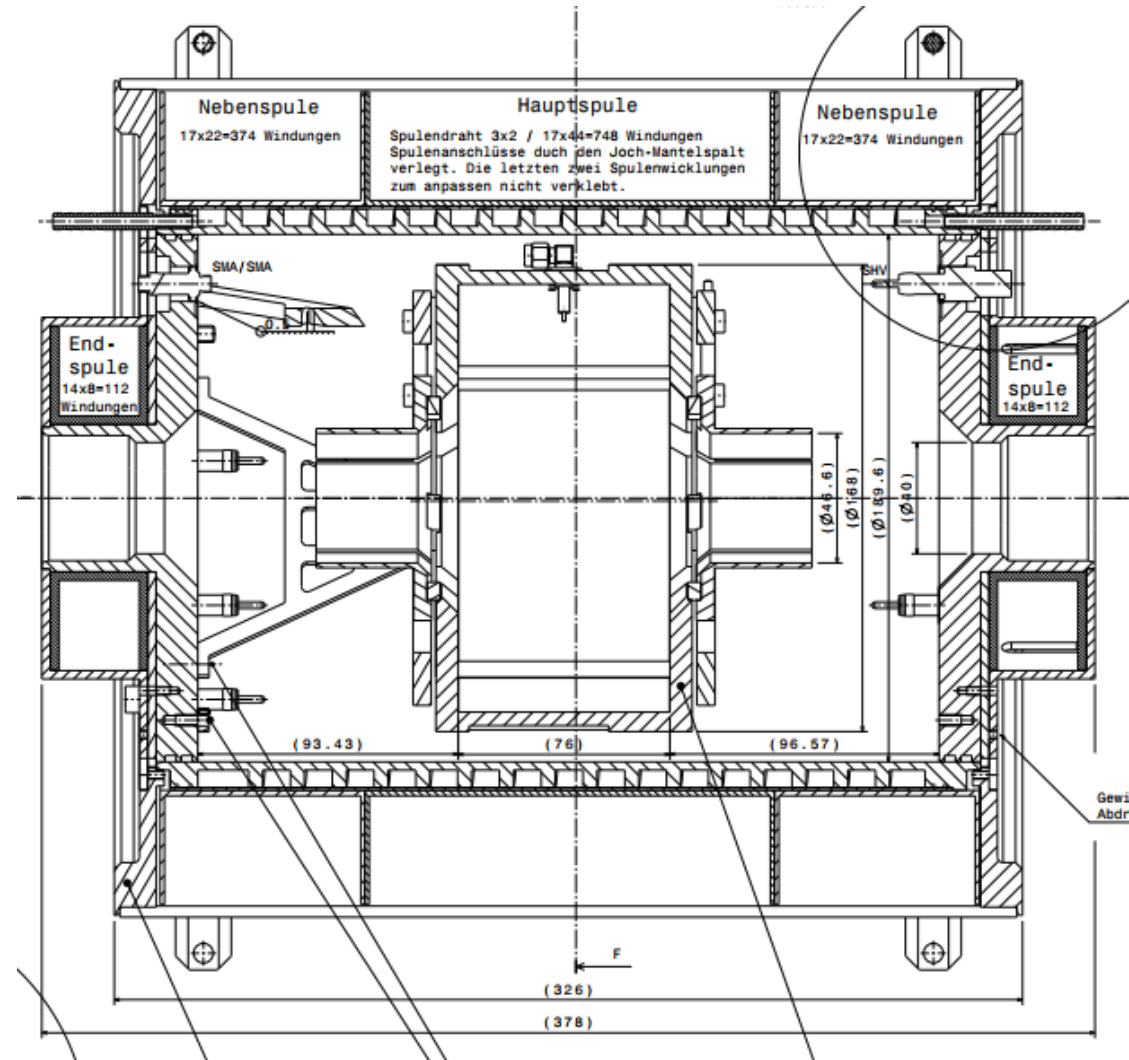
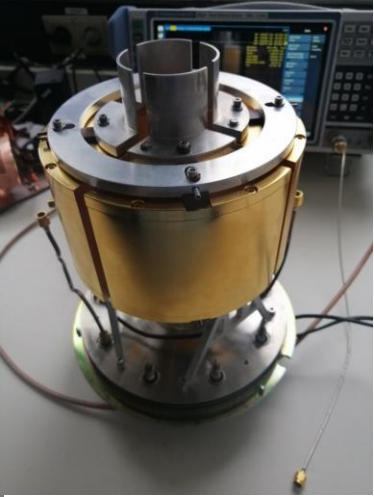


$$\omega_B \gg \omega_{Larmor}$$

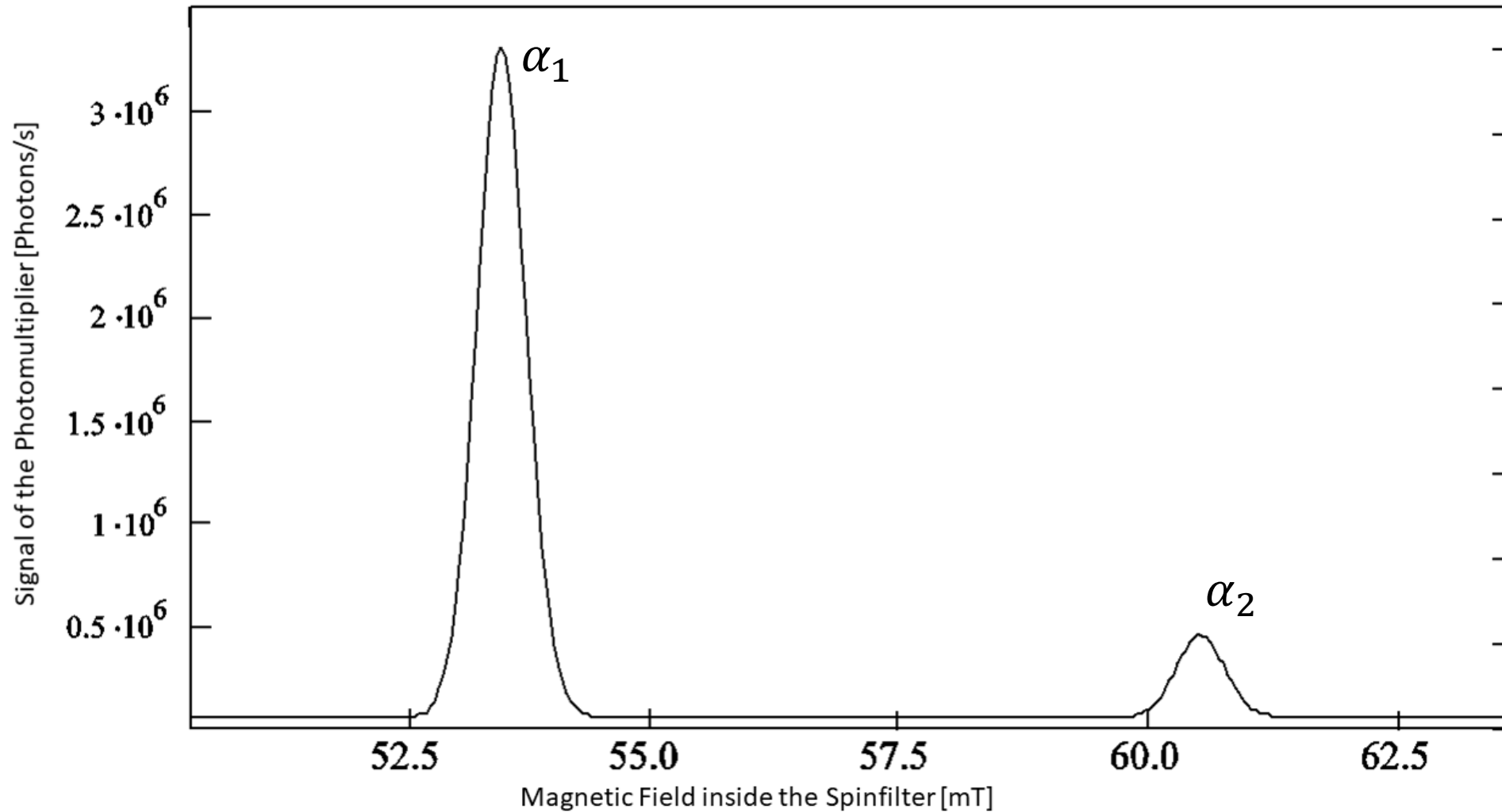


→ Talk by Nicolas Faatz

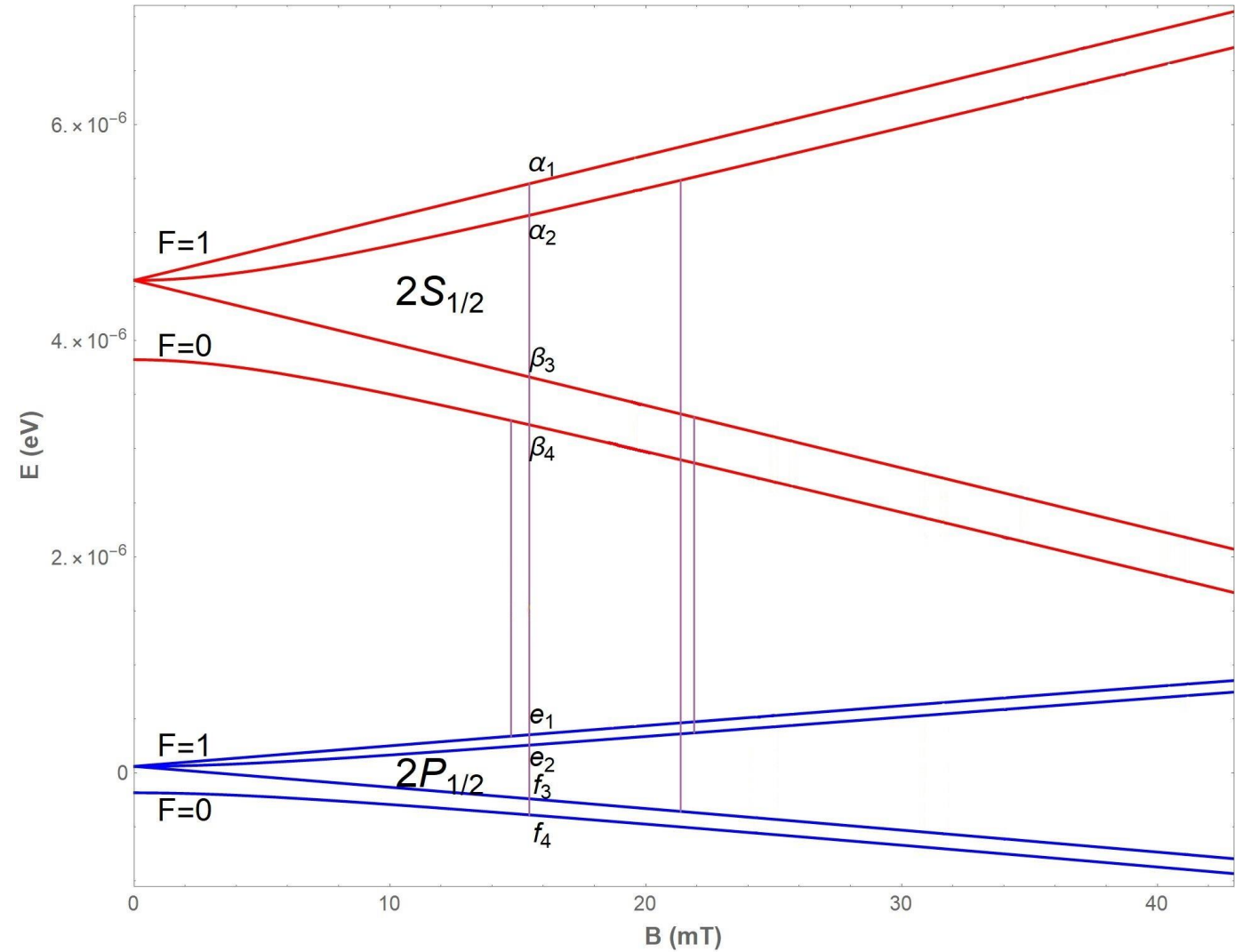
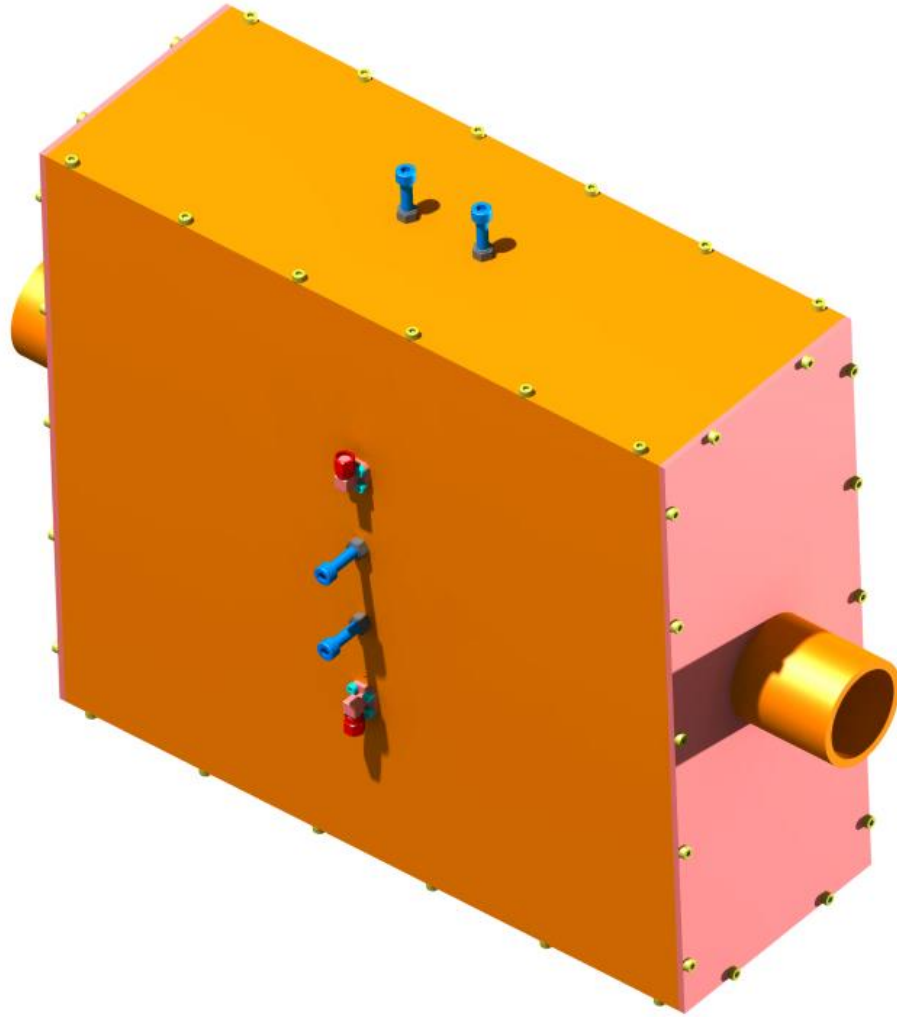
OLD SPINFILTER WITH ROUND CAVITY



OLD SPINFILTER WITH ROUND CAVITY

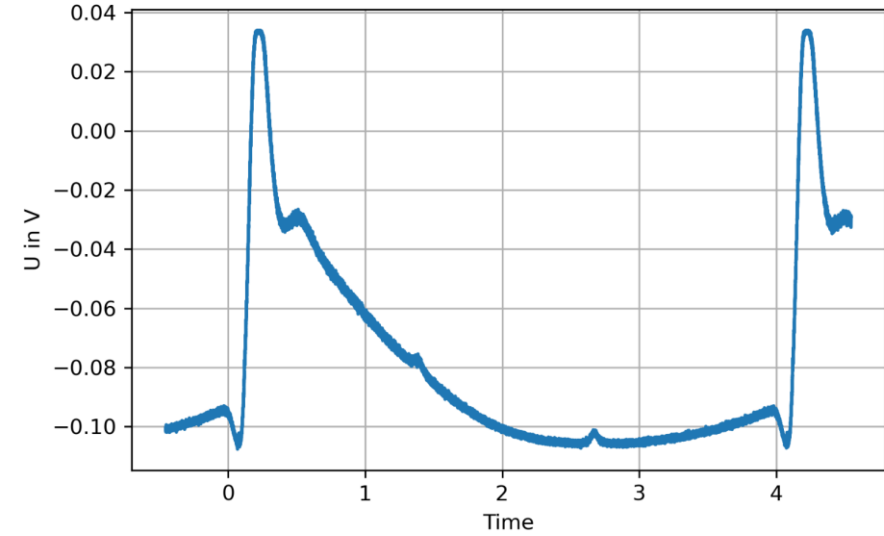


NEW RECTANGULAR CAVITY

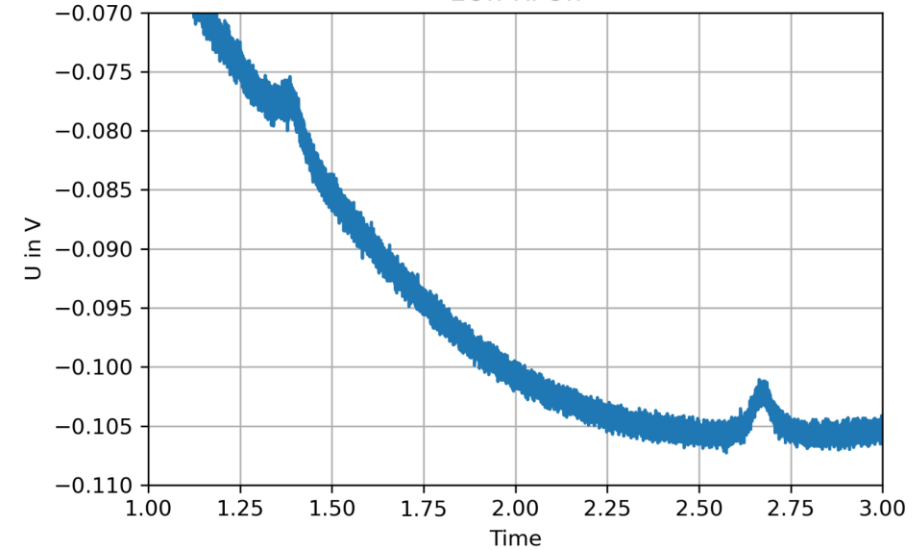


NEW SPINFILTER

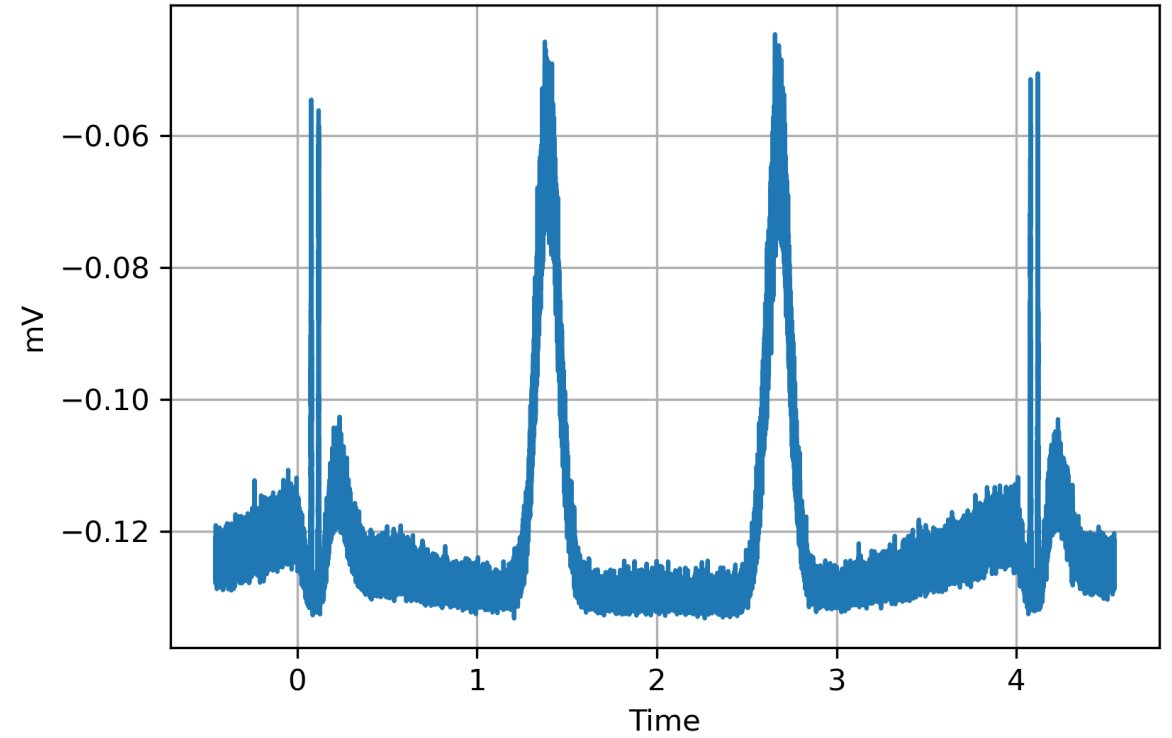
EOff RFOn



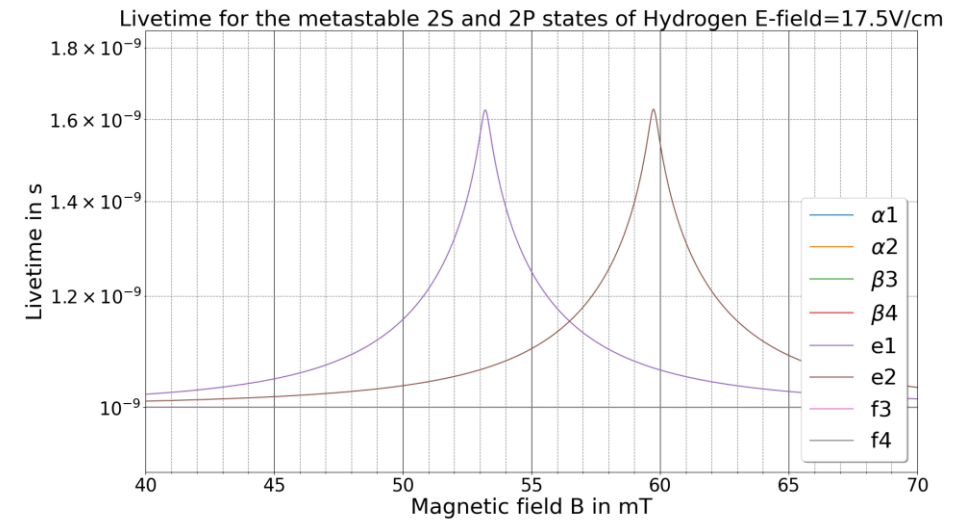
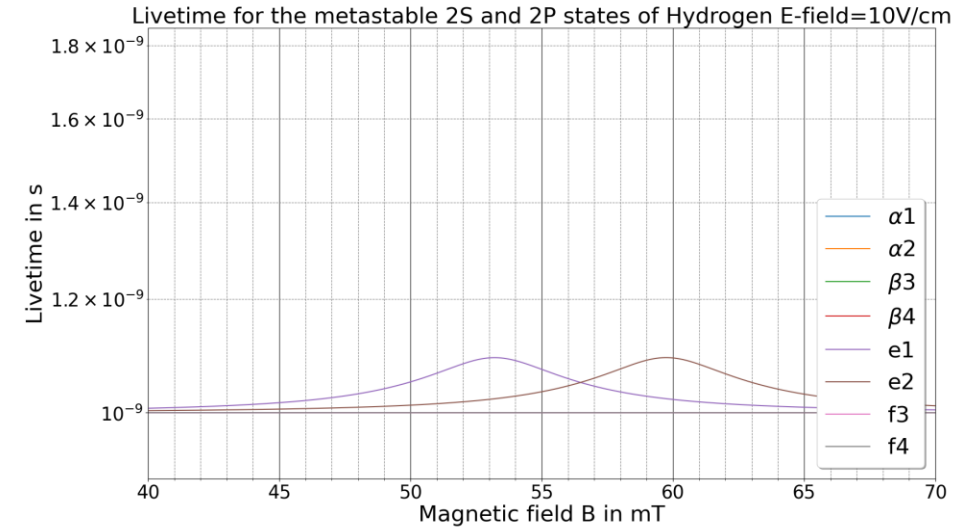
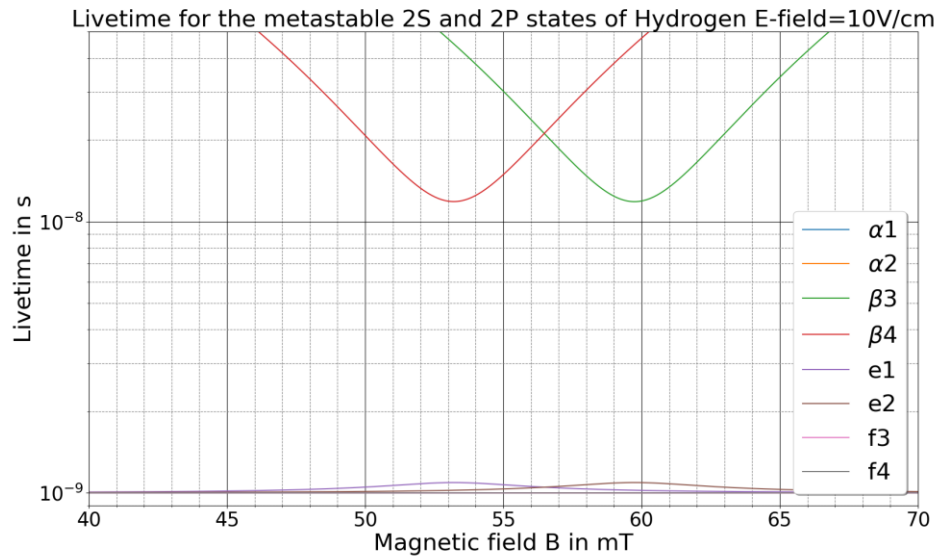
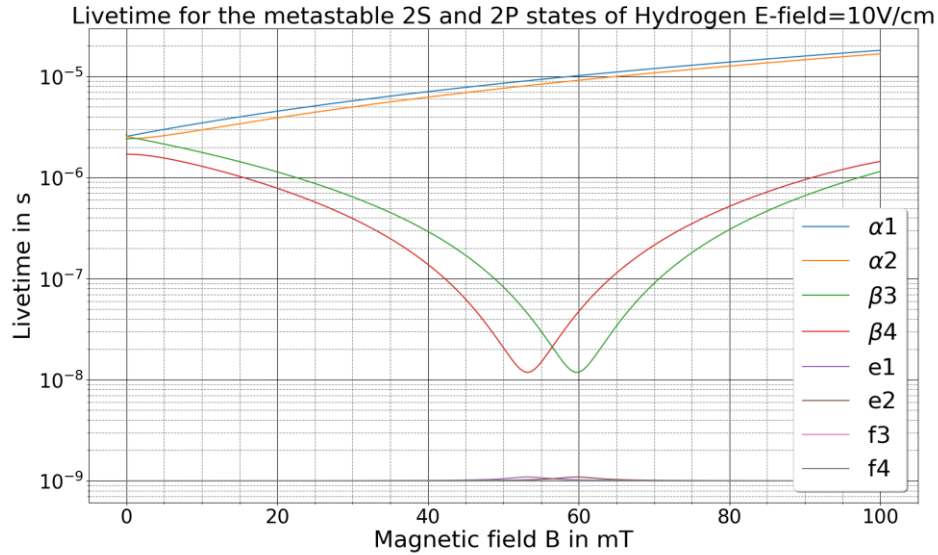
EOff RFOn



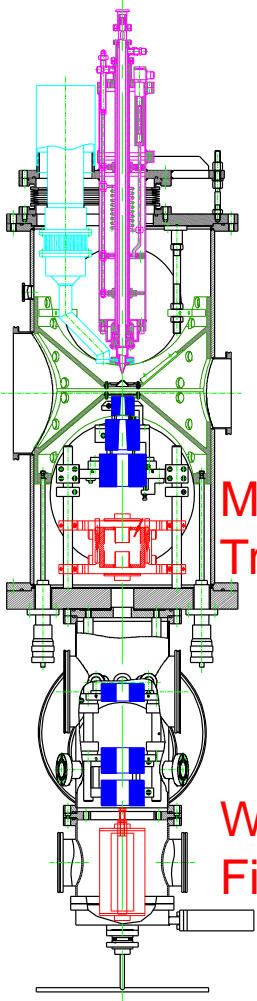
E100 RFON



NEW SPINFILTER



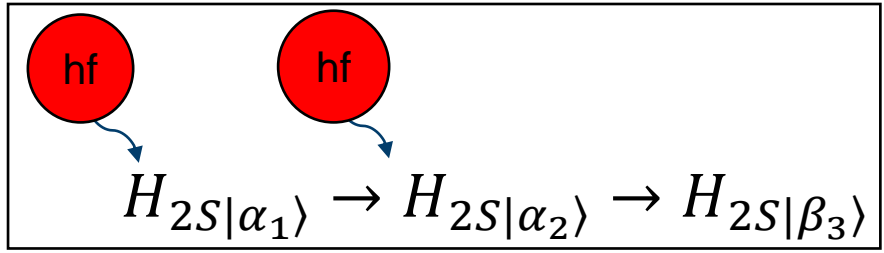
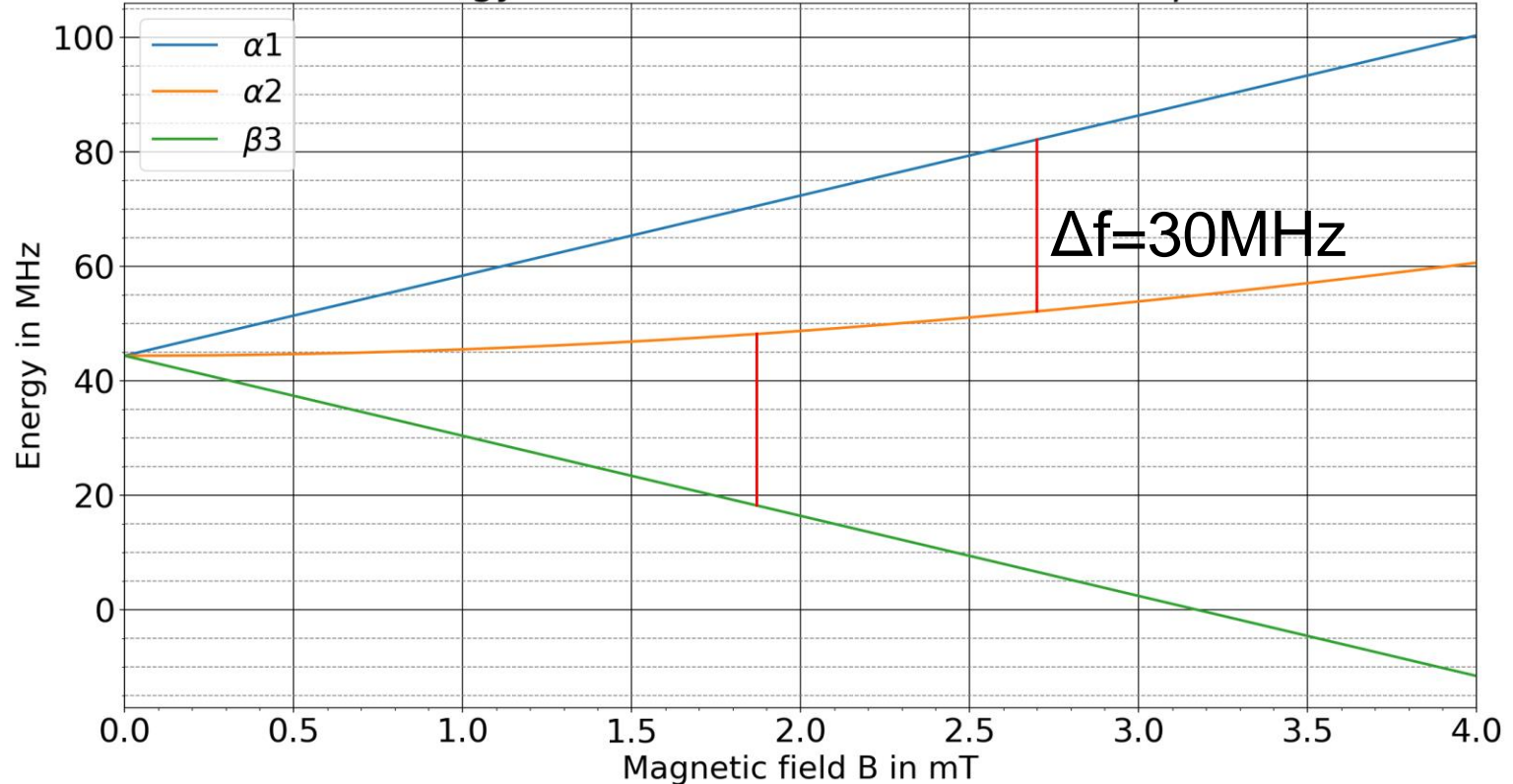
CLASSICAL TRANSITION UNIT



Medium Field Transition unit

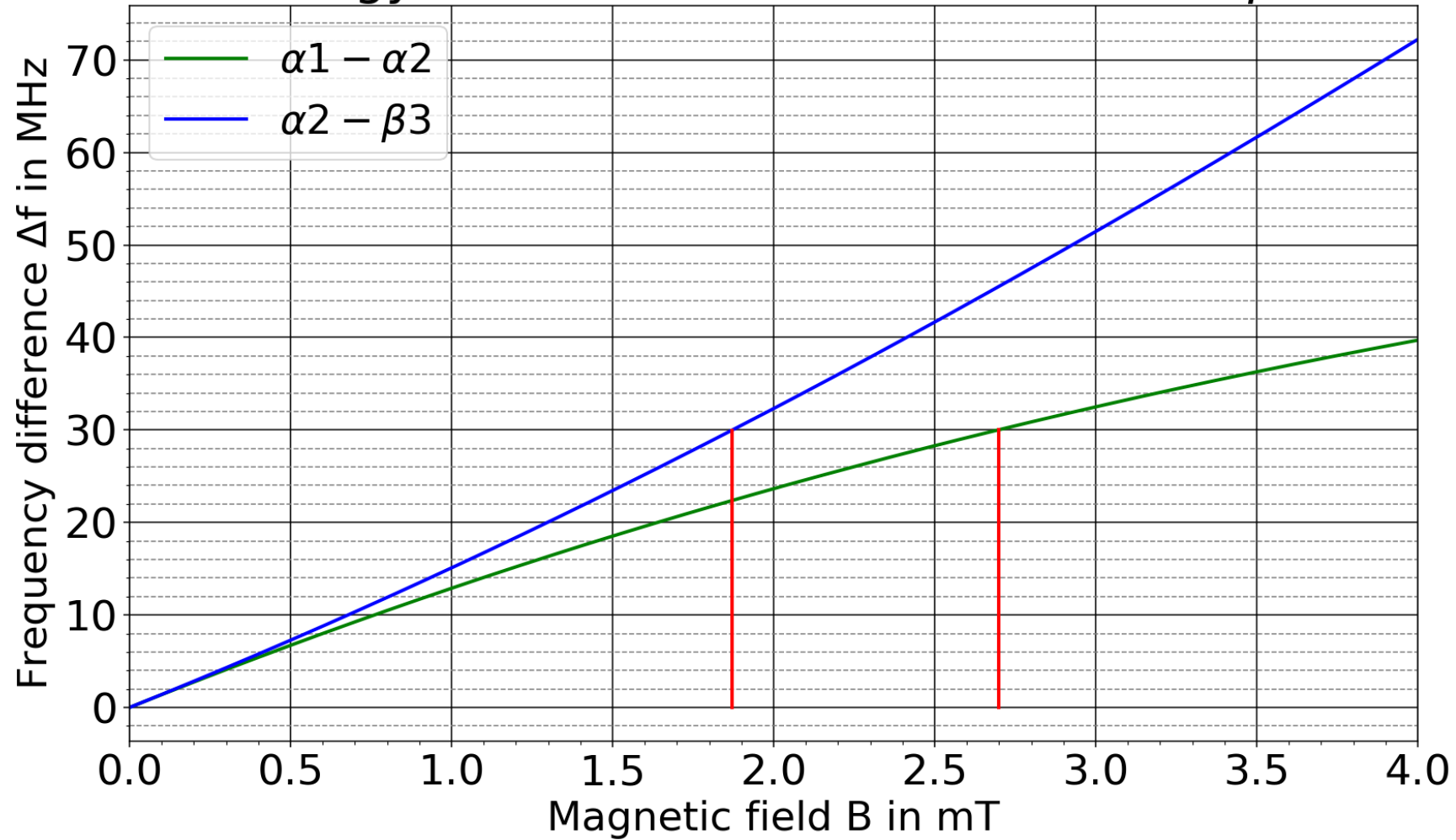
Weak & Strong Field Transition Unit

Energy differences between α_1 , α_2 and β_3

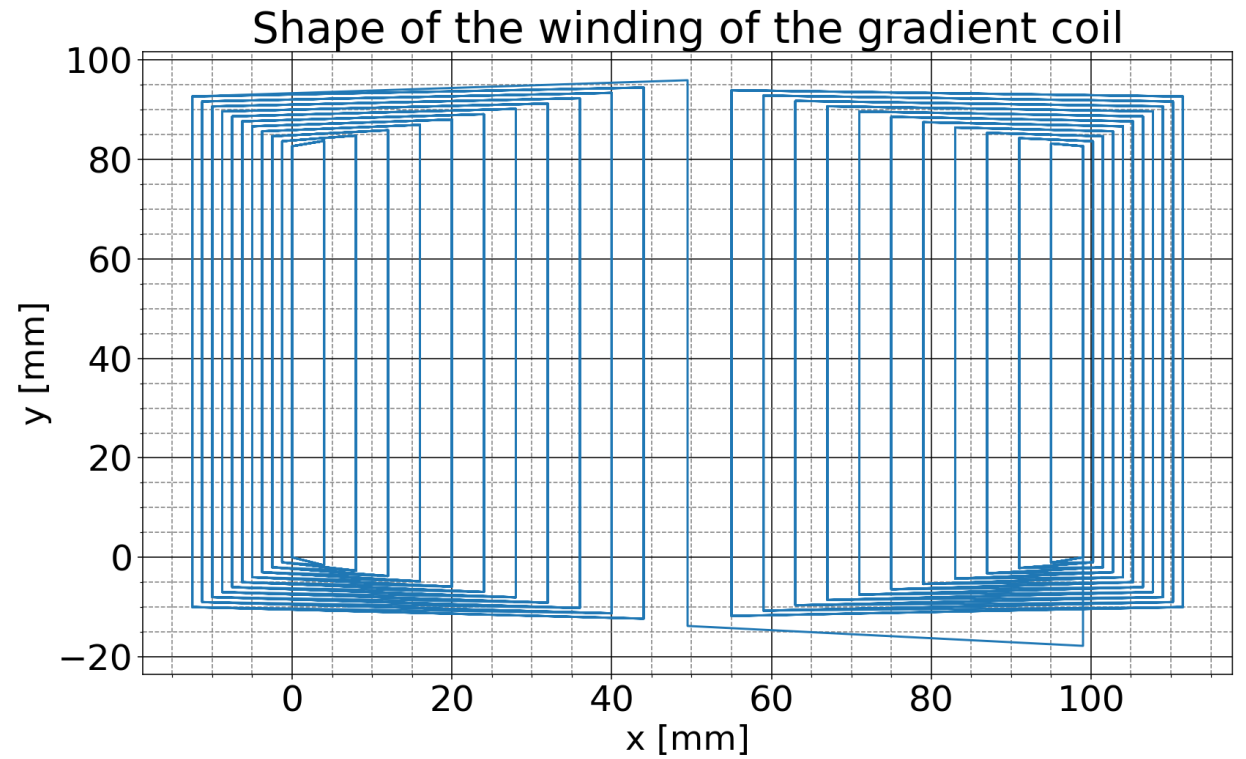
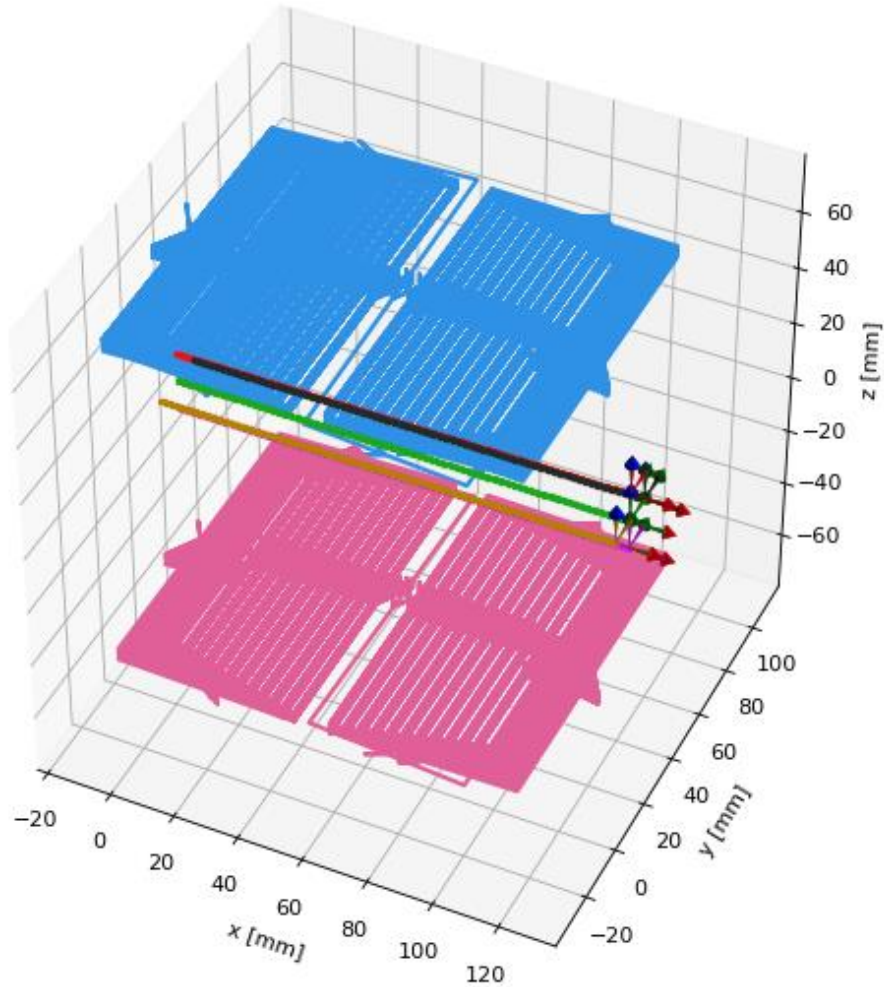


TRANSITION UNIT

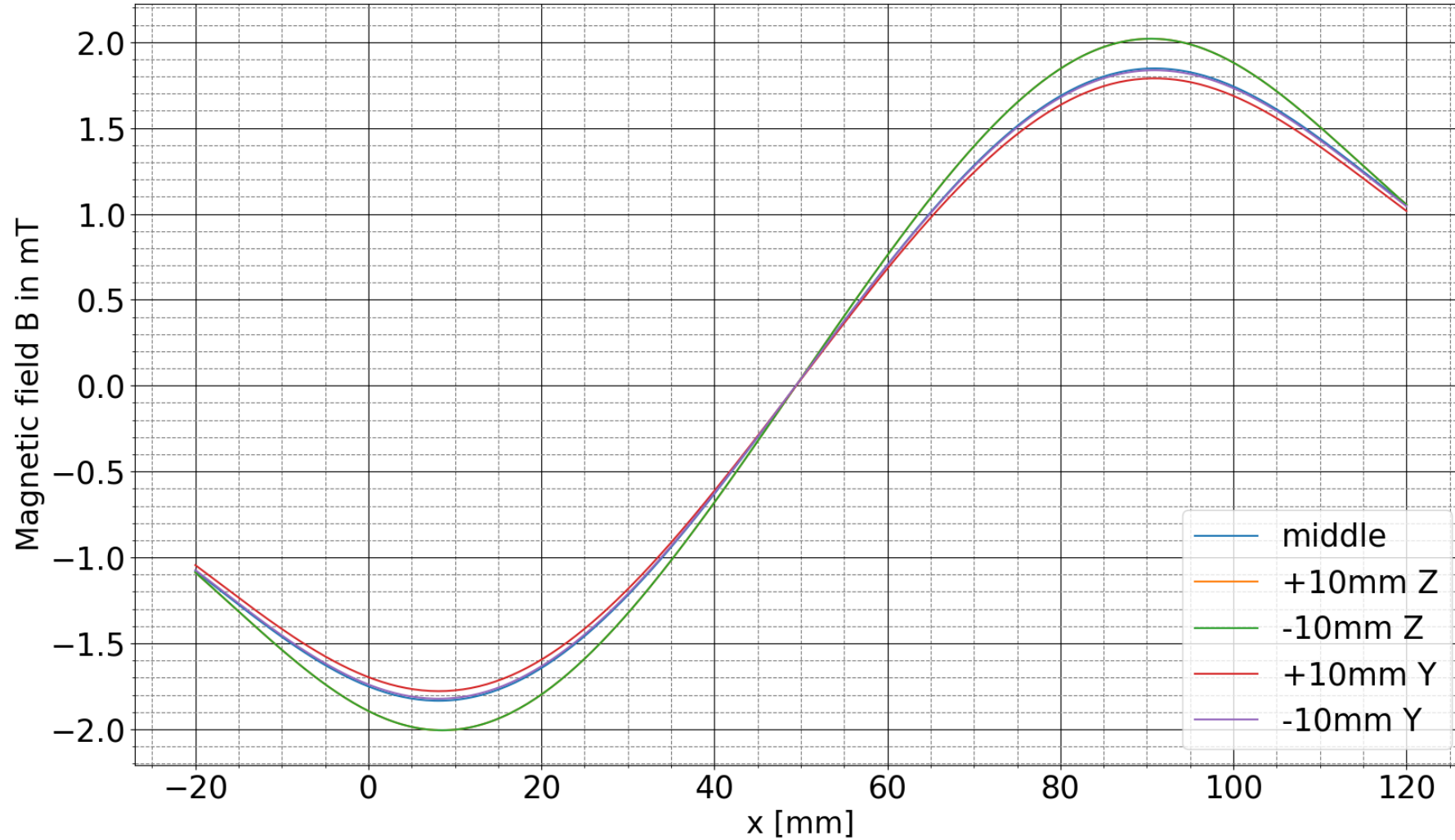
Energy differences between $\alpha 1$, $\alpha 2$ and $\beta 3$



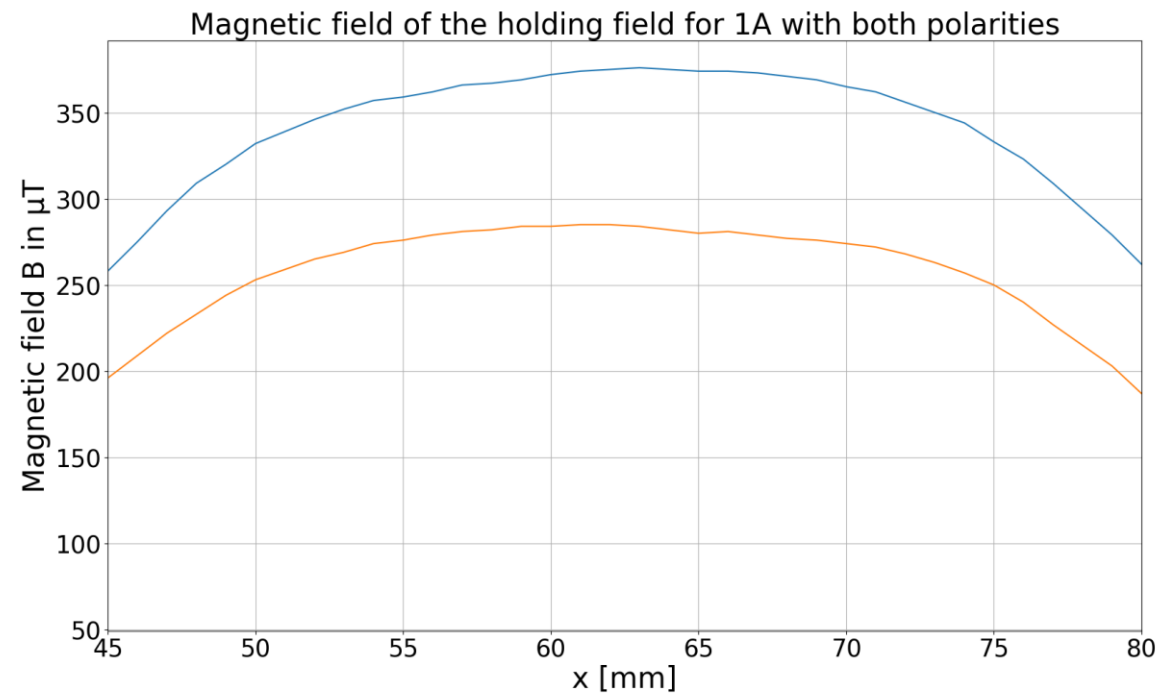
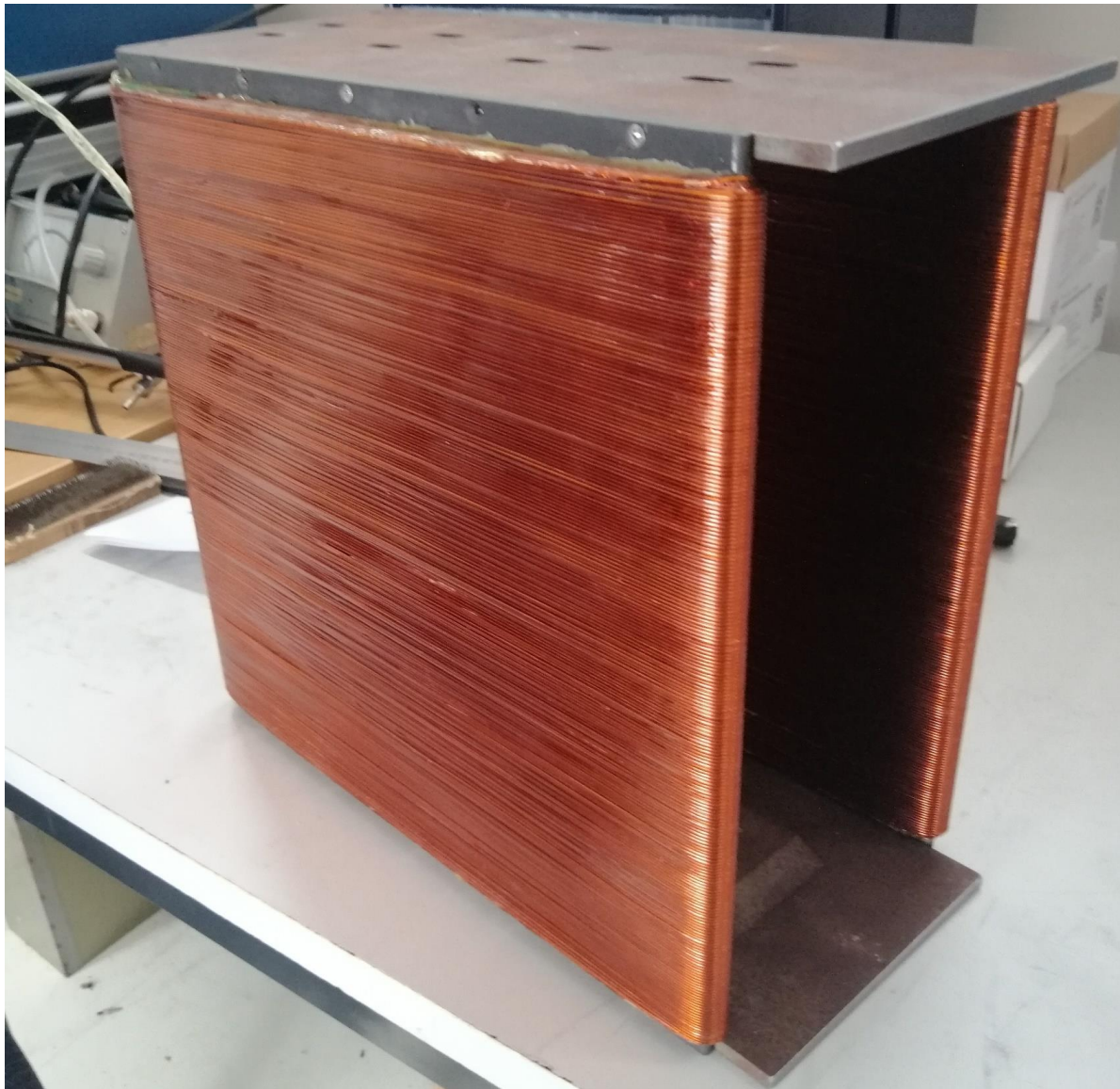
TRANSITION UNIT



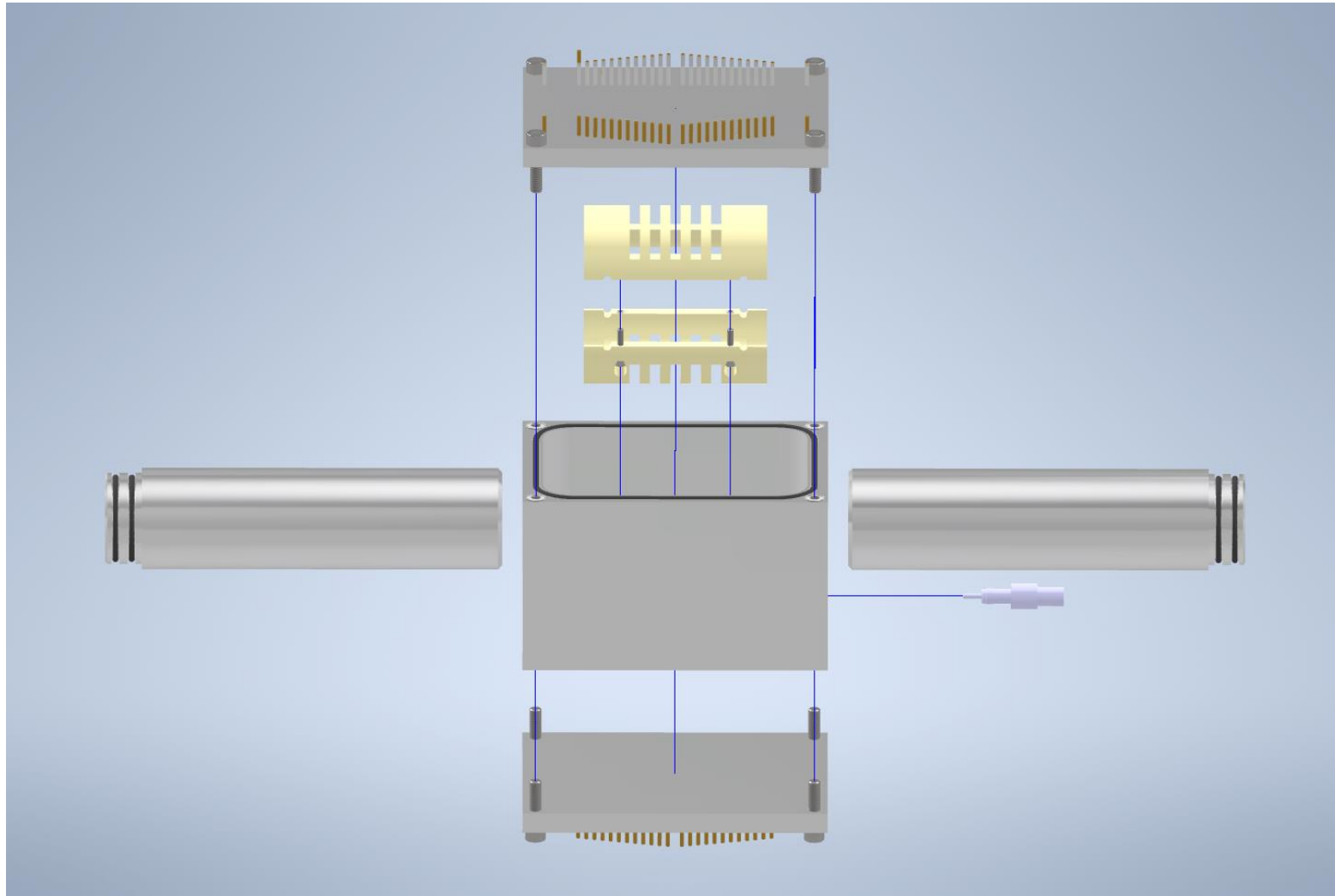
TRANSITION UNIT



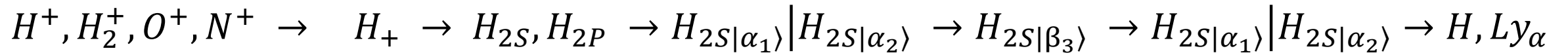
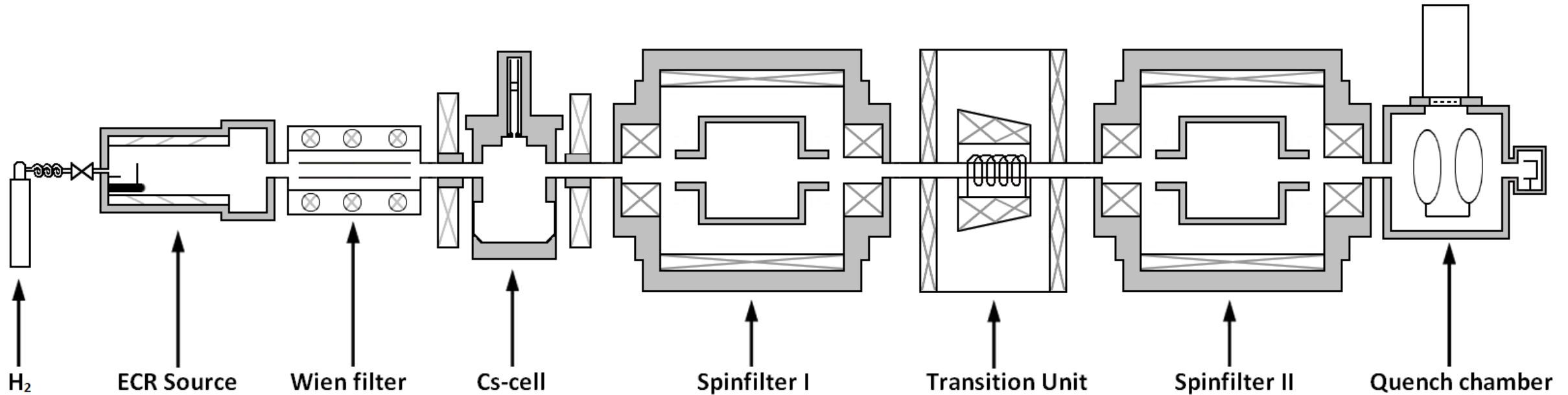
TRANSITION UNIT



TRANSITION UNIT



FUTURE EXPERIMENTS



THANK YOU FOR YOUR ATTENTION

- Any Questions???