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Boundary Conditions for the Test of a CLIC Damping Wiggler at ANKA

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CLICDW as source for ANKA-IMAGE

Functional requirements of the ANKA IMAGE beamline

- Radiation spectrum:

$$\text{Critical energy:} \quad E_c \geq 60\,\mathrm{keV}$$
$$\Rightarrow \text{Field amplitude:} \quad \tilde{B}_y \geq 3\,\mathrm{T}$$

- Optics: Beam splitter $\Rightarrow$ min. opening angle of radiation cone:

$$\psi_{\mathrm{rms}} \sim 3\,\mathrm{mrad}$$
$$\Rightarrow K \sim 15$$
$$\lambda_{\mathrm{W}}(3\,\mathrm{T}) \sim 50\,\mathrm{mm}$$

- Heat load:

$$P_0 \leq 12\,\mathrm{kW}$$

CLICDW as source for ANKA-IMAGE

Boundary conditions imposed by accelerator

- Beam-stay-clear (fixed gap):

$$g_{\mathrm{vac}} \geq 12\,\mathrm{mm}$$

- Length (flange to flange)

$$L \leq 3.5\,\mathrm{m}$$

- Field quality requirements

	vert.	hor.
1st field integral $[\mathrm{Tm}]$	$3 \cdot 10^{-5}$	$3 \cdot 10^{-6}$
2nd field integral $[\mathrm{Tm}^2]$	$4 \cdot 10^{-4}$	$1 \cdot 10^{-5}$
roll off at $\pm 10\,\mathrm{mm}$ [%]	0.5	
max field amp. variation [%]	1	

CLICDW design parameters

Summary of the current status of the technical discussion.

	CERN specs	orig. ANKA specs
SC-Technology	Nb-Ti	Nb-Ti
Coil Geometry	vertical racetrack	(hor. racetrack)
Vacuum Gap	13 mm	$\geq$12 mm[1]
Magnetic Gap	18 mm	17 mm
Field Amplitude (I_{op})	3 T	$\geq$3 T
I_{op} / I_{crit}	83%	85%
Period Length	56 mm	$\sim$50 mm
K	16	$\sim$15
Cryo Conzept	LHe-Bath Cryostat +He-Cryoplant	LHe-Bath Cryostat +Cryocoolers (closed cylcle)

[1] Parameters crucial for the operation at ANKA and utilization as source for IMAGE are highlighted

Timeline

Item	CERN	ANKA Specs	IMAGE
Conceptual Design Review	12/2010		
Contract	02/2011	02/2011	
Prelim. Design Review		03/2011	
Prototype test complete	(09/2010)	05/2011	
Technical Design Review	05/2011	06/2011	
Delivery of frontend optics			01/2012
Installation of beamline			06/2012
Factory acceptance test	08/2012	04/2012	
Delivery to ANKA	10/2012	05/2012	
Installation and final acceptance test w/o beam	10/2012	06/2012	

Budget

$\longrightarrow$ Remarks by Anke-Susanne Müller and Tilo Baumbach via Webex

Legal Boundary Conditions

A few general remarks (details and strategies by Tilo Baumbach)

- KIT is developing superconductive IDs in a strategic partnership with Babcock-Noell, Germany
- This partnership involves non-disclosure-agreements which have to be taken into account when setting up the envisaged collaboration on CLIC damping wigglers
- A separate contract should be concluded for the project of building and testing a Nb-Ti-CLICDW prototype
- A seperate MoU/contract might be required for two-party projects on ID development (Nb_3Sn field measurements, COLDDIAG)
- Further contributions of KIT to CTF3 (Particle tracking, beam dynamcs, CSR studies) may be covered by the general CTF3 MoU
- KIT is interested in continuing the successful collaboration with CERN on the aforementioned subjects. The three different cases, however, should be clearly distiguished in the following discussion