Status Feb. 2023 on KIT Test Facilities for TA in EURO-LABS

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KIT – Karlsruhe Institute of Technology (Karlsruhe, Germany)

EURO-LABS WP3 meeting 9th Feb. 2023

This project has received funding from the European Union's Horizon Europe Research and Innovation programme under Grant Agreement No 101057511.

Outline

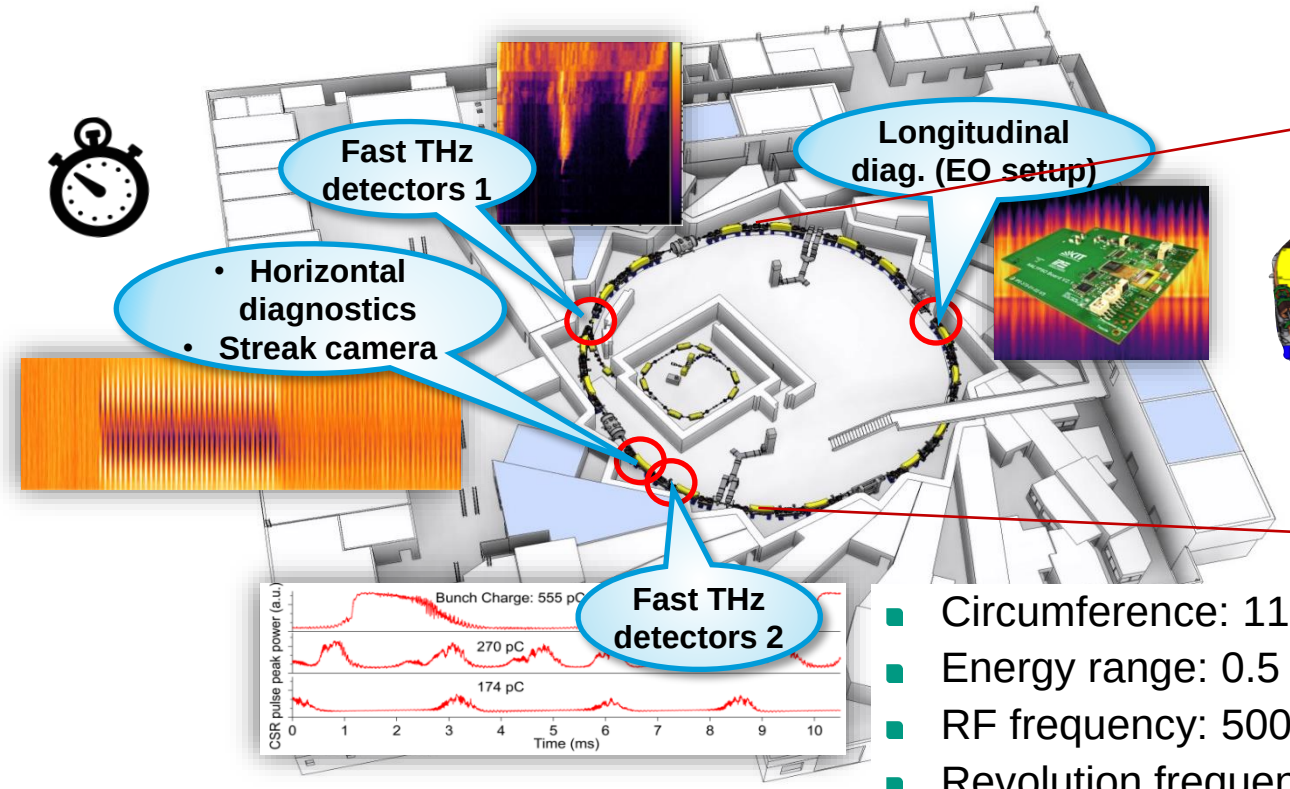
- **KIT** summary of first steps related to the activities of task WP3.3
- Status on acc. test facilities **FLUTE** & **KARA** related to TA activities
- Milestones and Deliverables by month M6
- Offer for TA on the KIT website
  www.ibpt.kit.edu/project_EURO_LABS.php

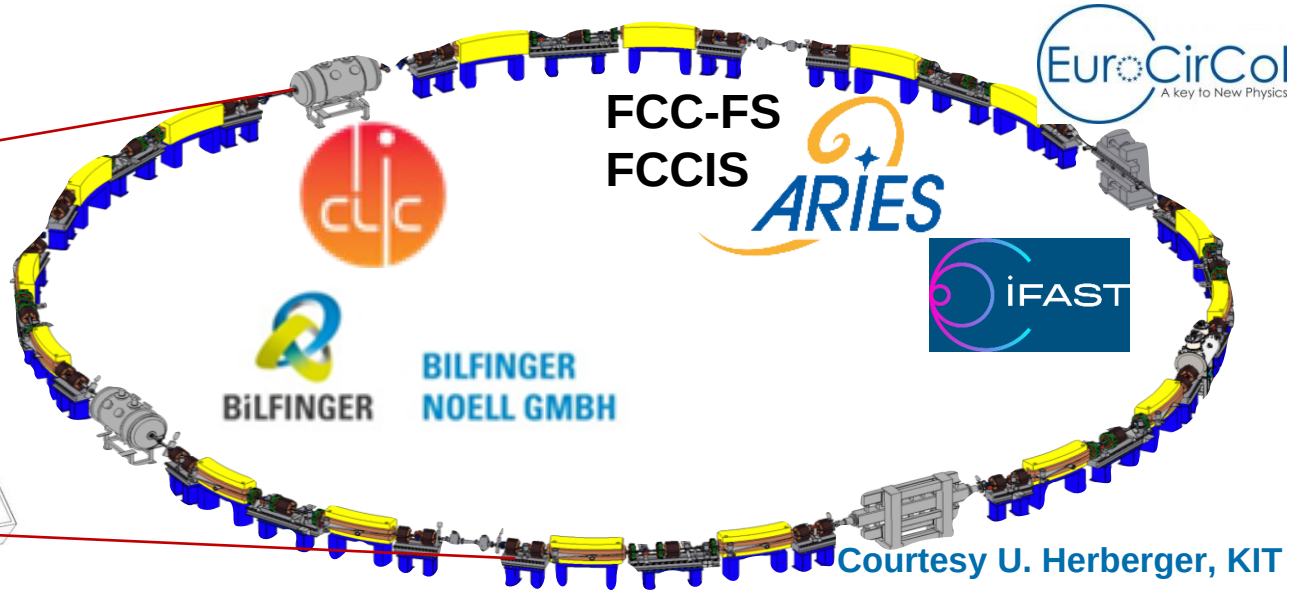
➔ **ready for TA application forms and planning TA experiments**

KARA (KArlsruhe Research Accelerator)

KARA = electron storage ring for the KIT Light Source & accelerator test facility at KIT

with distributed synchronized sensor network: emitted CSR, energy spread, bunch profile, phase space tomography in MBI*





Courtesy U. Herberger, KIT

- Circumference: 110.4 m
- Energy range: 0.5 - 2.5 GeV
- RF frequency: 500 MHz
- Revolution frequency: 2.71 MHz
- Operation Mo:1pm-Sa:8am//23h/d//~~30w/y~~
- Single or multi-bunch mode

Short bunch mode

- Lower momentum compaction factor → Bunch length: 45 ps ↘ few ps
- Coherent synchrotron radiation (CSR) in THz range
- Negative momentum compaction factor

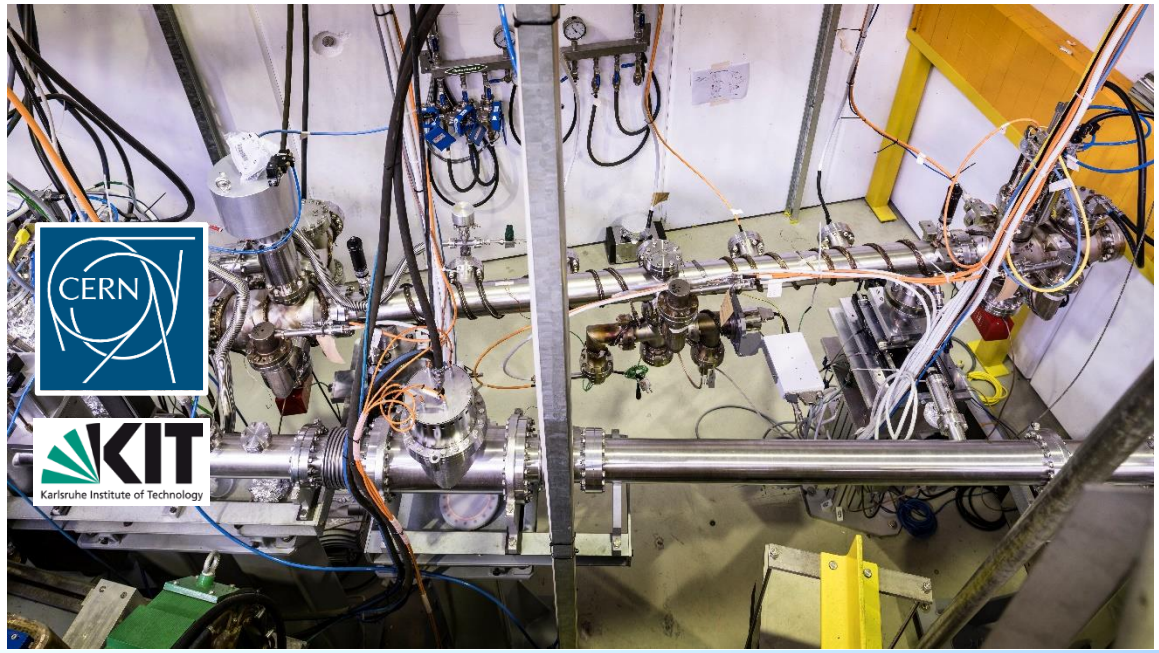
www.ibpt.kit.edu/kara

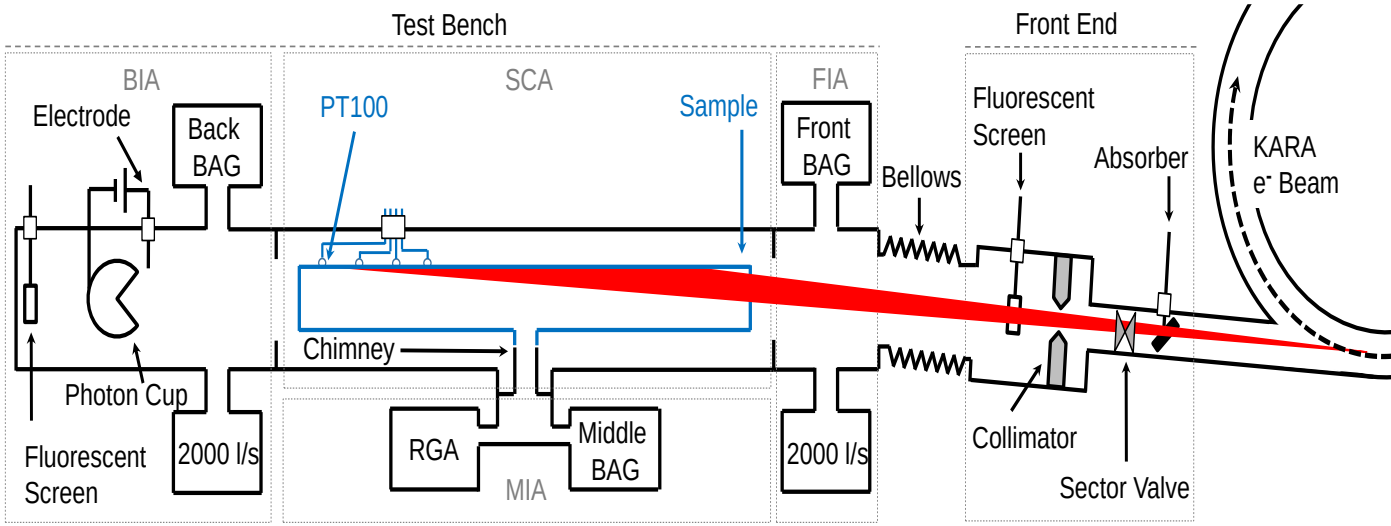
Contact: Marcel.Schuh@kit.edu

*MBI = micro bunching instabilities

1st TA proposals for KARA announced by CERN

- CERN request for BESTEX beamline at KARA: **1st CERN visit at KIT on 23th Jan 2023**
- photo-desorption studies on FCC vacuum chamber prototypes
- tests possible under cryogenic conditions (liquid Nitrogen cooling)



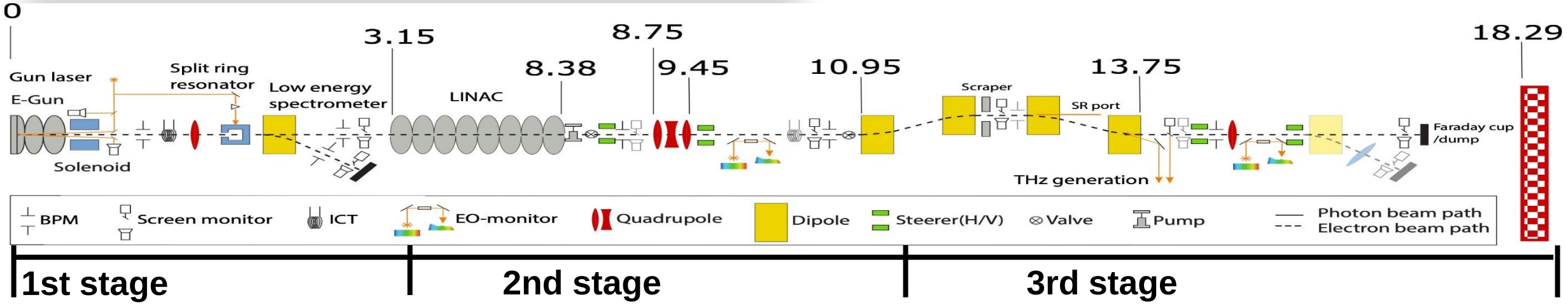


photos: Breig, KIT

FLUTE: 5 MeV RF upgrade is being completed

FLUTE (Ferninfrarot Linac- Und Test-Experiment)

Final electron energy	5 to 50 (41)	MeV
Electron bunch charge	0.001 - 1 (3)	nC
Electron bunch length	1 - 300	fs
Pulse repetition rate	up to 10	Hz
THz E-Field strength	up to 1.2	GV/m



1st stage
(refurbishment in final stage)

- E- gun (*improved gun delivered*)
- Solenoid *(improved delivered)*
- 1st diagnostics section with 5 years in operation

2nd stage
(new RF commissioned)

- Linac *(conditioned)*
- 2nd diagnostics section (*ready*)
- Quadrupole triplet *(in SAT)*

3rd stage
(1st out-of-beam tests being started)

- Bunch compressor
- e^- & THz diagnostics

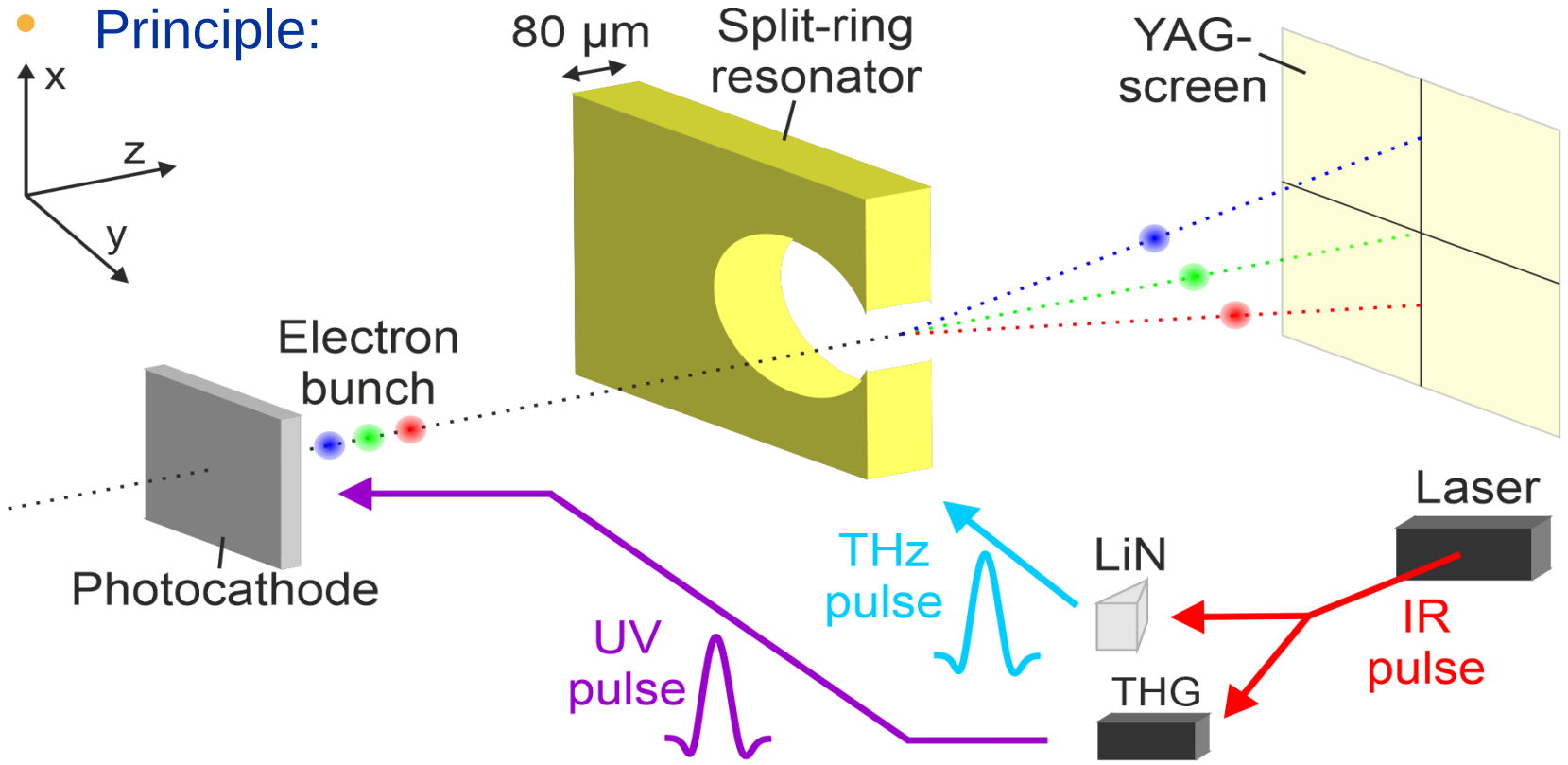
www.ibpt.kit.edu/flute

Contact: Michael.Nasse@kit.edu

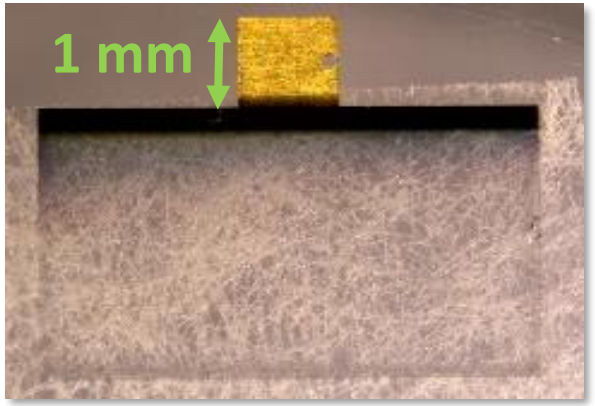
Interest of PSI and Uni Bern for TA at FLUTE

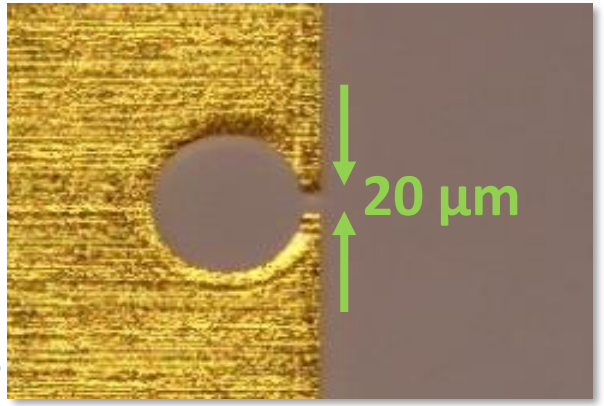
SRR experiment (Split Ring Resonator)

- Goal: single shot longitudinal diagnostics based on THz-driven streaking using a SRR amplifier
- Collaboration with the University of Bern and PSI
- Principle:



Courtesy M. Nabinger, KIT





Photos M.J. Nasse, KIT

Acknowledgements

The accelerator team

Axel Bernhard, Edmund Blomley, Erik Bründermann, Kantaphon Damminsek, Samira Fatehi, Stefan Funkner, Julian Gethmann, Andreas Grau, Bastian Haerer, Michael Hagelstein, Erhard Huttel, Dima El Khechen, Stephan-R. Kötter, Bennet Krasch, Igor Kriznar, Katharina Mayer, Sebastian Maier, Anton Malygin, Sebastian Marsching, Yves-Laurent Mathis, Wolfgang Mexner, Akira Mochihashi, Matthias Nabinger, Michael J. Nasse, Gudrun Niehues, Marvin-D. Noll, Alexander Papash, Meghana Patil, Micha Reißig, Sebastian Richter, Robert Ruprecht, David Saez de Jauregui, Andrea Santamaria Garcia, Jens Schäfer, Thiemo Schmelzer, Patrick Schreiber, Marcel Schuh, Markus Schwarz, Nigel J. Smale, Johannes L. Steinmann, Pawel Wesolowski, Christina Widmann, Chenran Xu, and Anke-Susanne Müller

KIT Institutes IBPT, ETP, IHM, IMS, IPE, IPS, LAS

Collaboration partners: examples