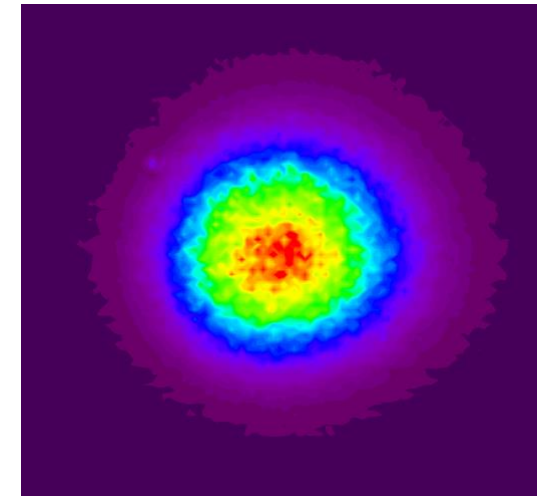
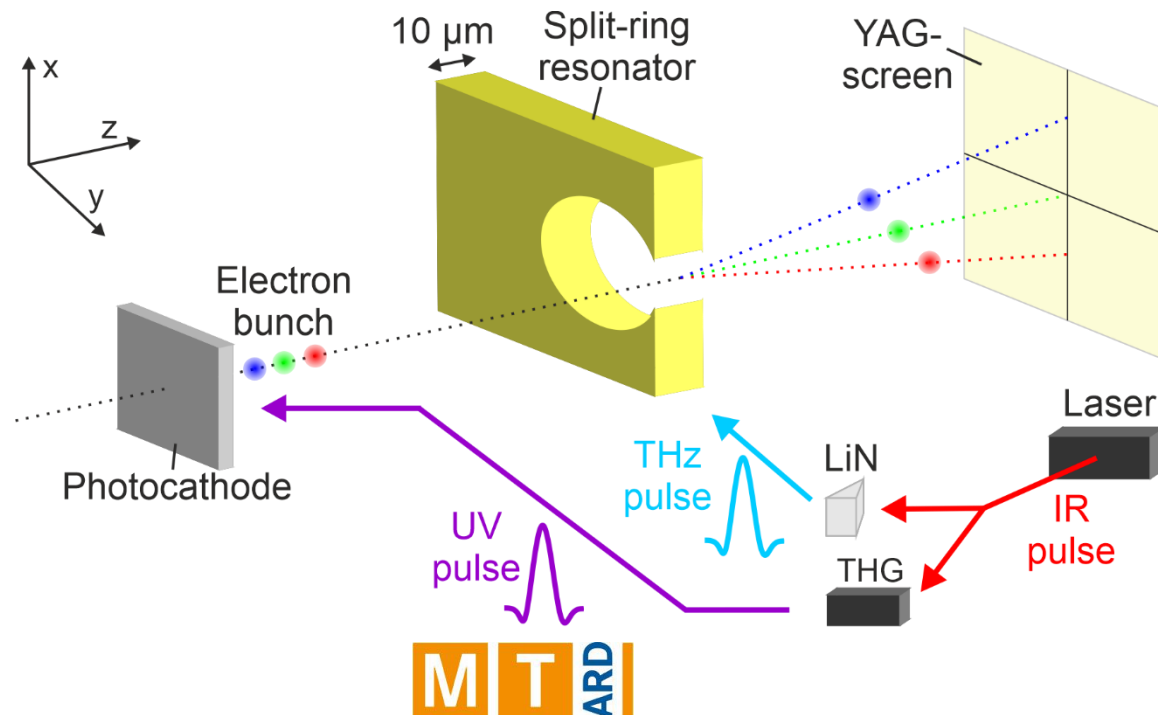
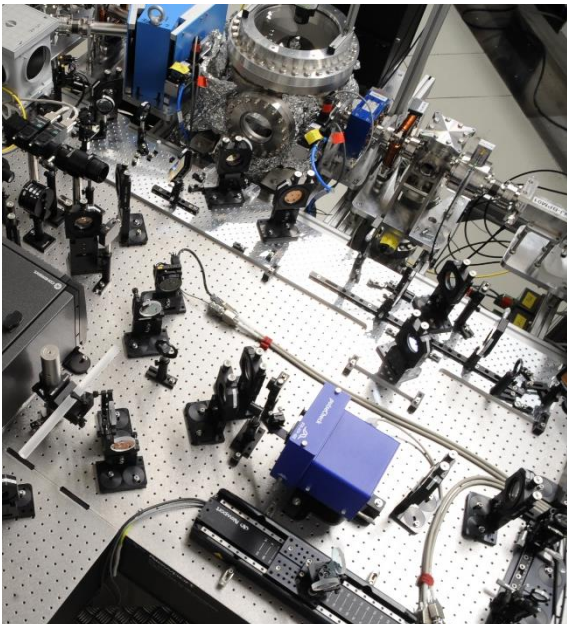


## Latest developments in the split-ring resonator experiment at FLUTE

M. Nabinger, M.J. Nasse, T. Schmelzer, N. Smale, J. Schäfer, B. Härer, G. Niehues, S. Funkner, E. Bründermann, R. Ruprecht, A.-S. Müller (KIT, Karlsruhe, Germany)

R. Ischebeck, M. Dehler, M. Moser, V. Schlott (PSI, Villigen, Switzerland)

Z. Ollmann, M. Hayati, T. Feurer (University of Berne, Berne, Switzerland)



# FLUTE: Accelerator test facility at KIT

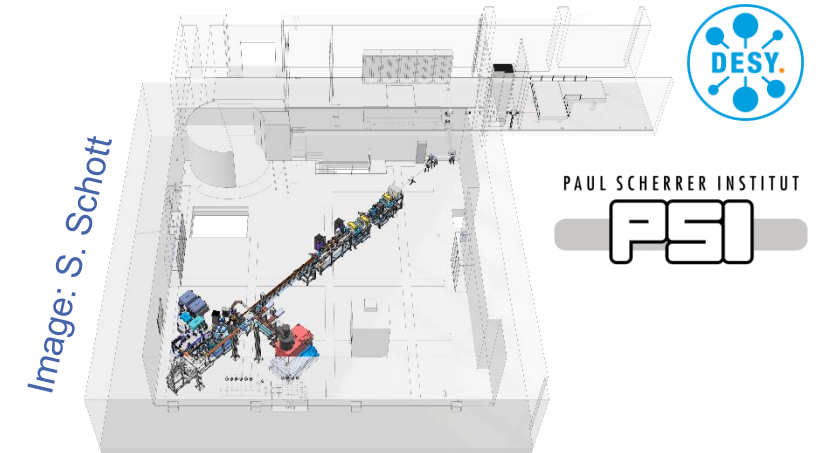


## ■ FLUTE (Ferninfrarot Linac- Und Test-Experiment)

- Test facility for accelerator physics within ARD
- Experiments with THz radiation

## ■ R&D topics

- Serve as a test bench for new beam diagnostic methods and tools
- Systematic bunch compression and THz generation studies
- Develop single shot fs diagnostics
- Synchronization on a femtosecond level

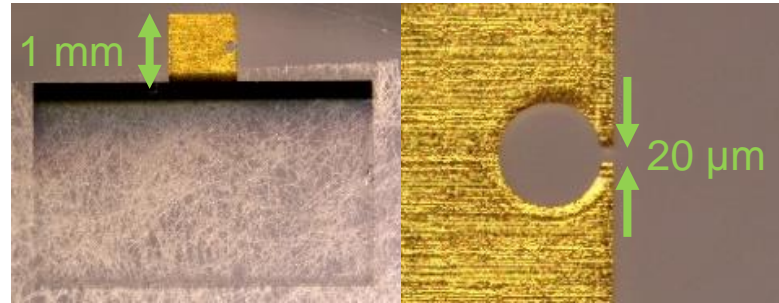


Final electron energy	~ 41	MeV
Electron bunch charge	0.001 - 3	nC
Electron bunch length	1 - 300	fs
Pulse repetition rate	10	Hz
THz E-Field strength	up to 1.2	GV/m

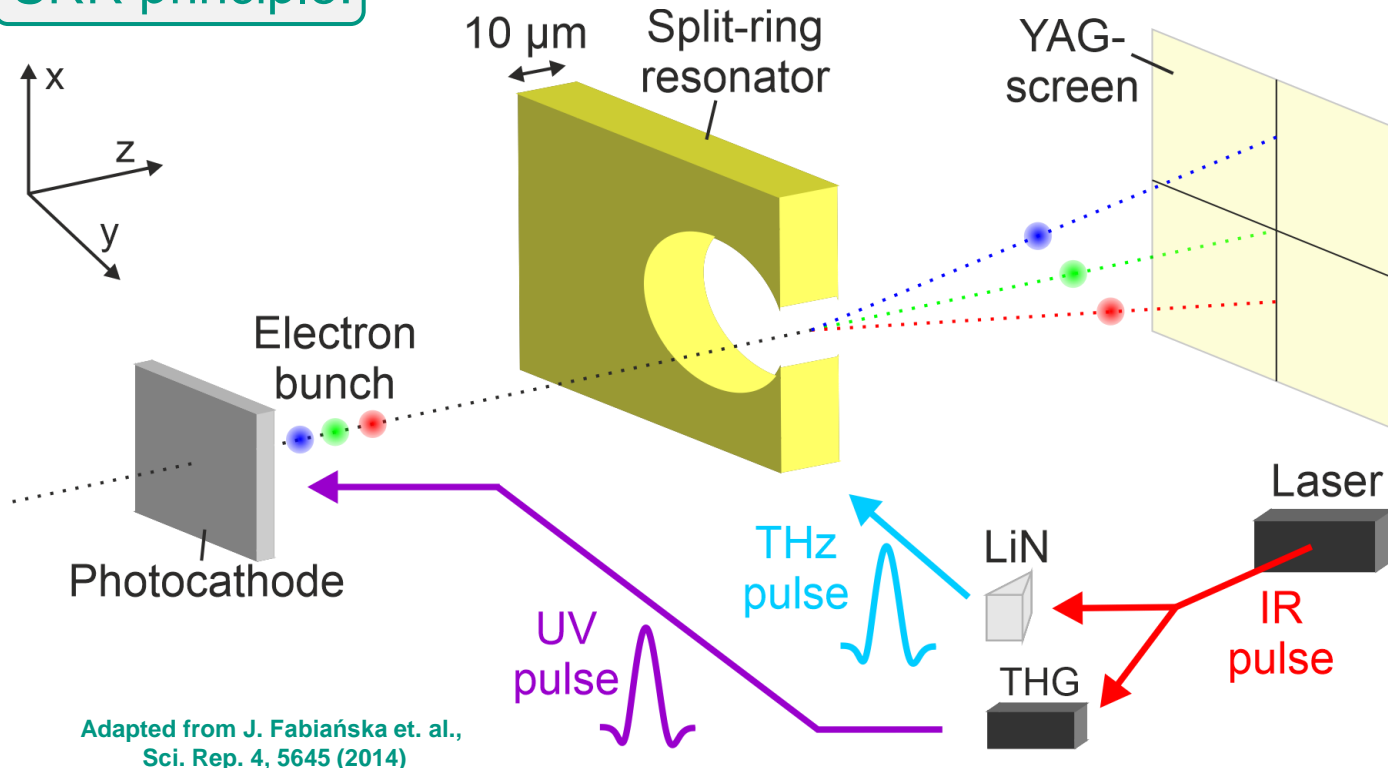
[www.ibpt.kit.edu/flute](http://www.ibpt.kit.edu/flute)

# Split-ring resonator (SRR) experiment - principle

Experimental goal:  
Measurement of longitudinal bunch profile on a fs scale

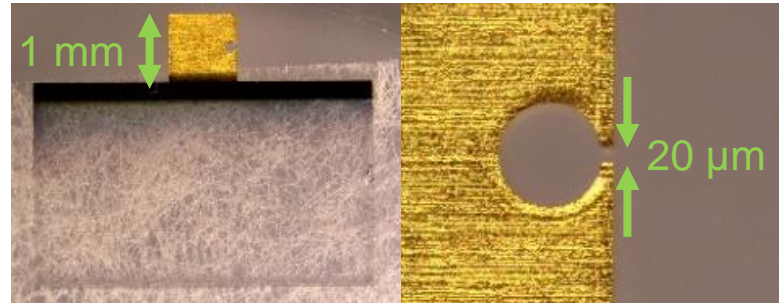


## SRR principle:



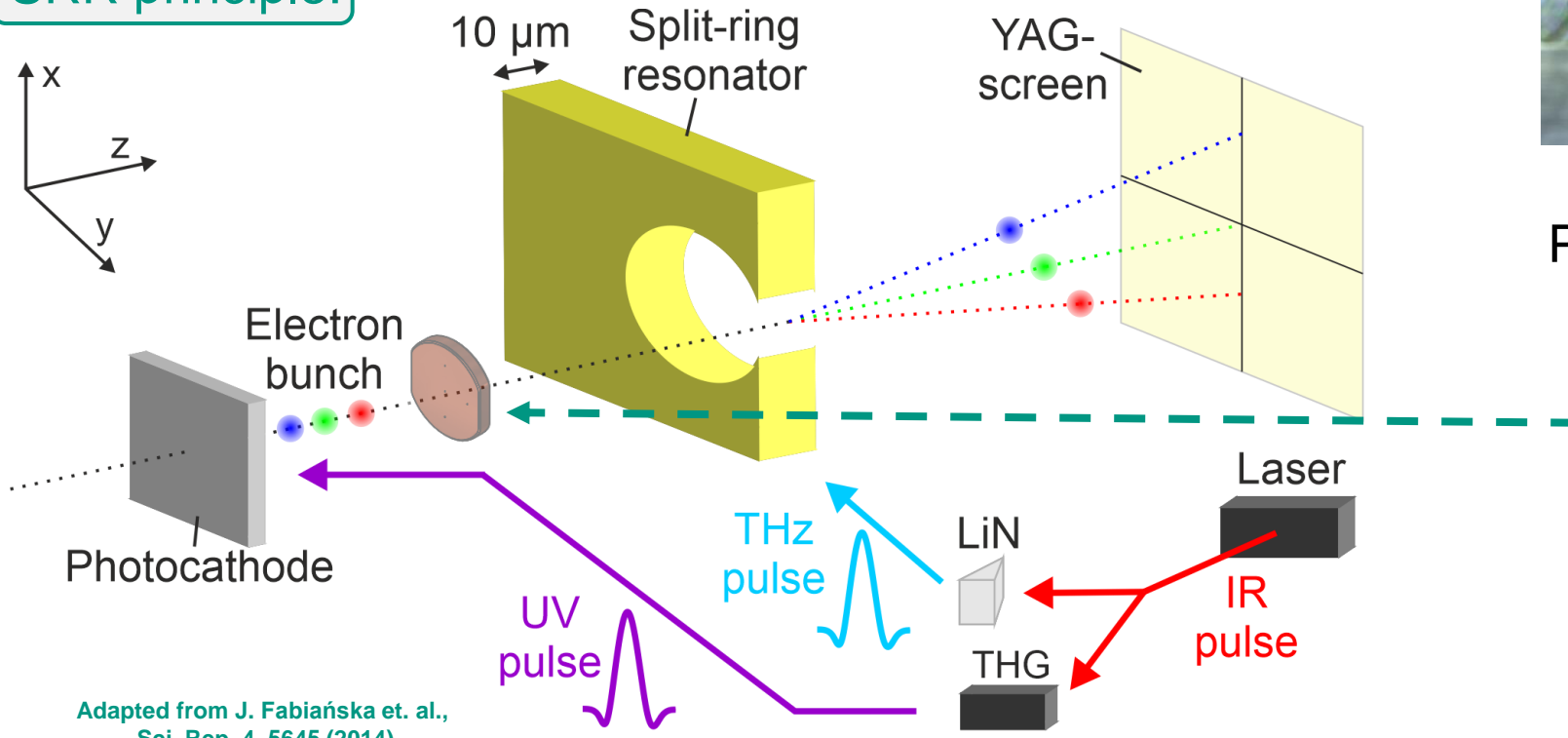
# Split-ring resonator (SRR) experiment - principle

**Experimental goal:**  
Measurement of longitudinal bunch profile on a fs scale



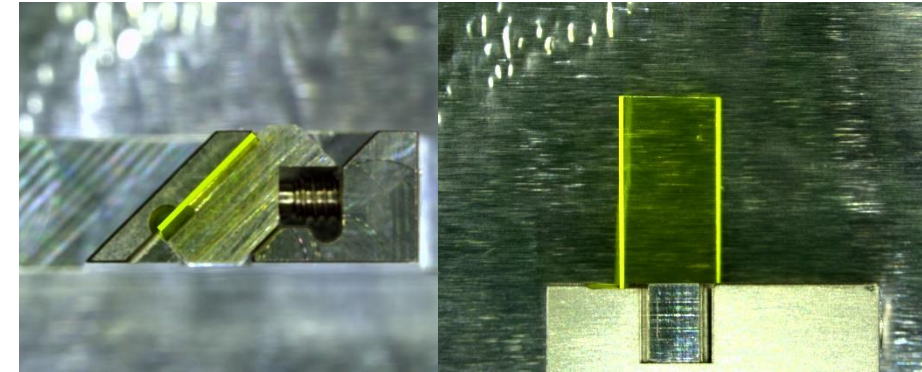
Courtesy: M. J. Nasse

**SRR principle:**



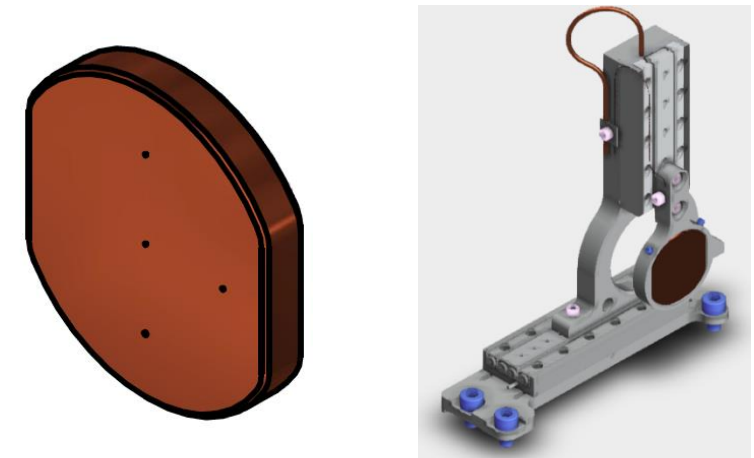
Adapted from J. Fabiańska et. al.,  
Sci. Rep. 4, 5645 (2014)

**New holder for SRR and YAG-screen:**



Courtesy: T. Borkowski

**Planned Pinhole/aperture for e-beam:**

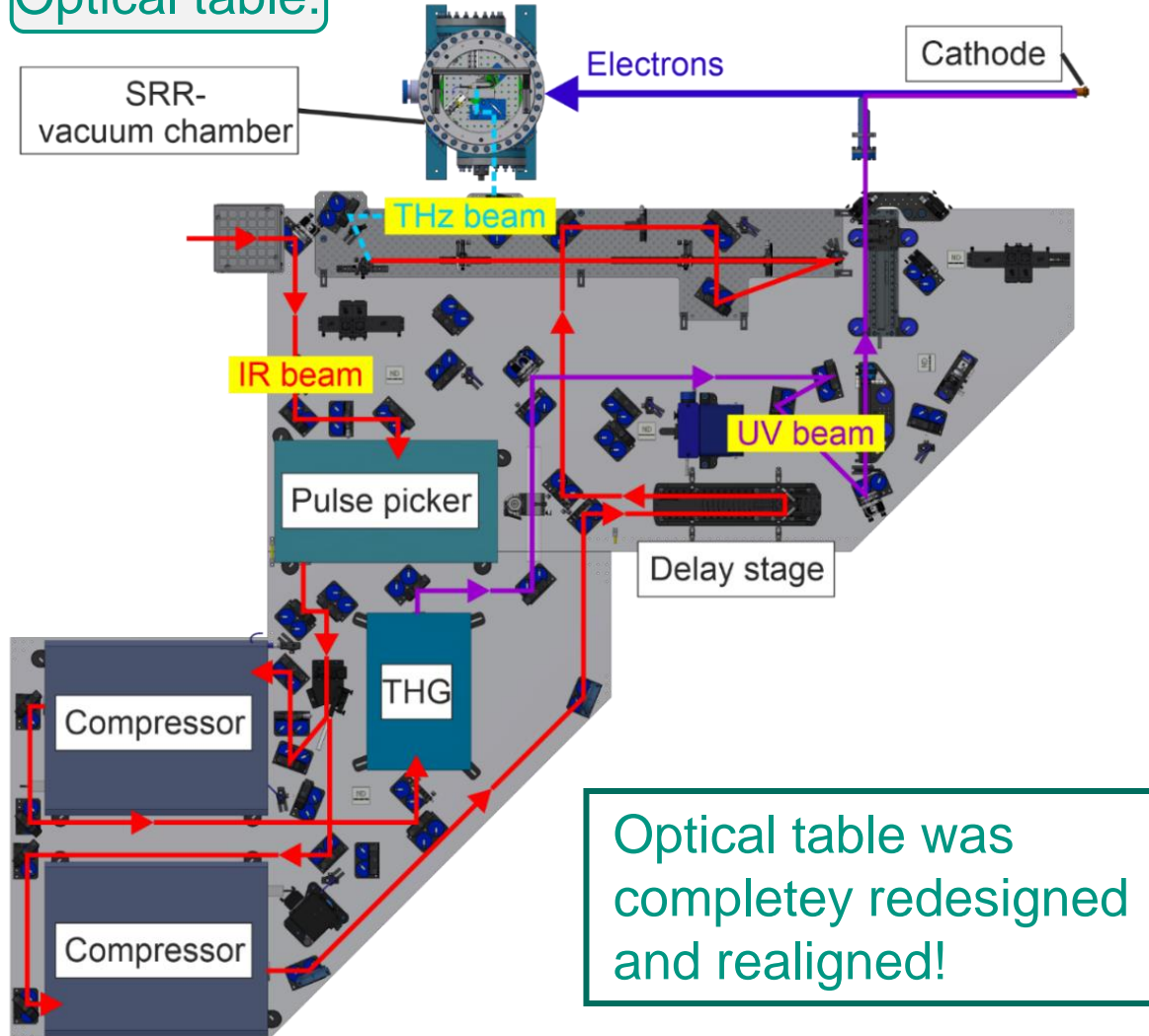


Courtesy: S. Schott



# SRR experiment – optical table

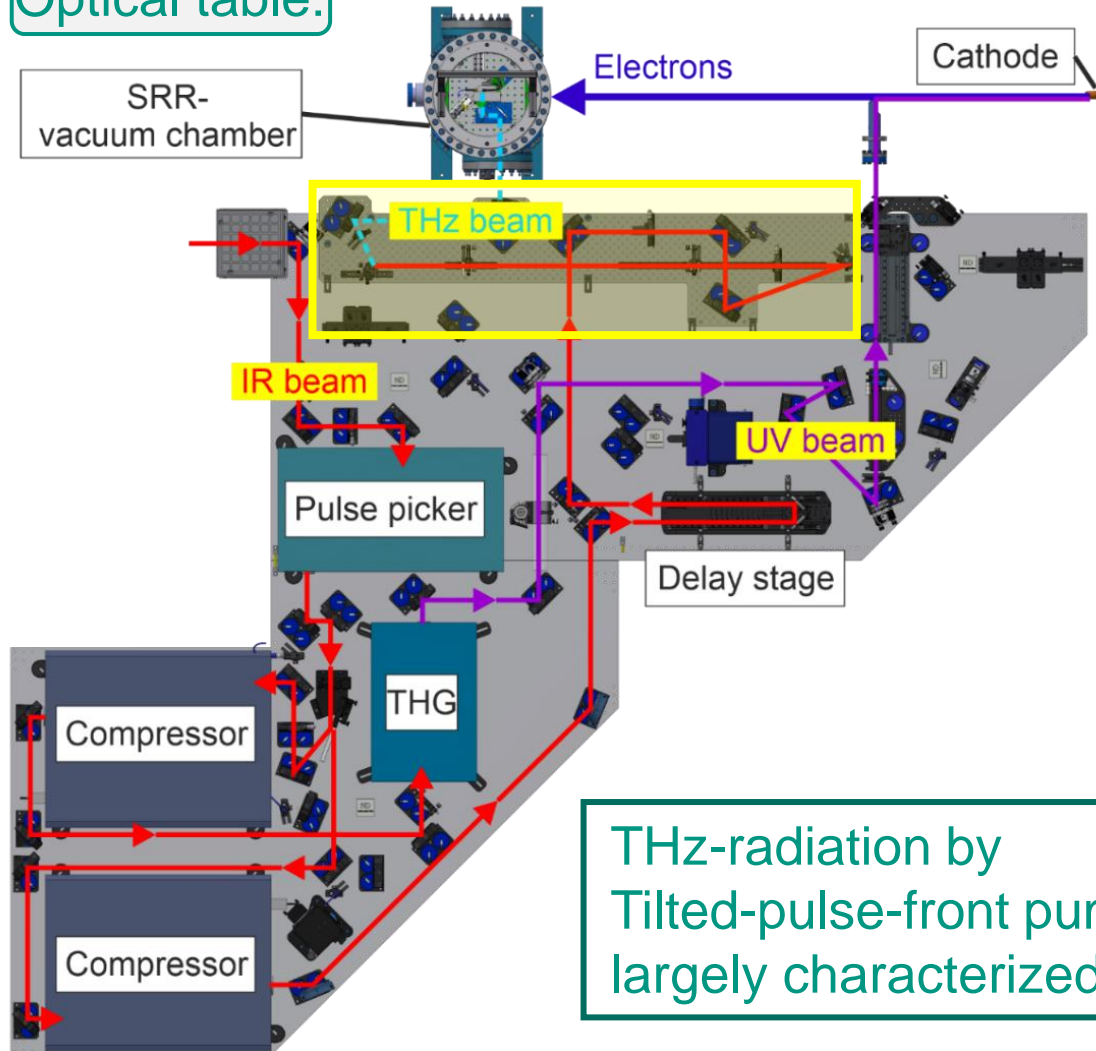
Optical table:



Optical table was completely redesigned and realigned!

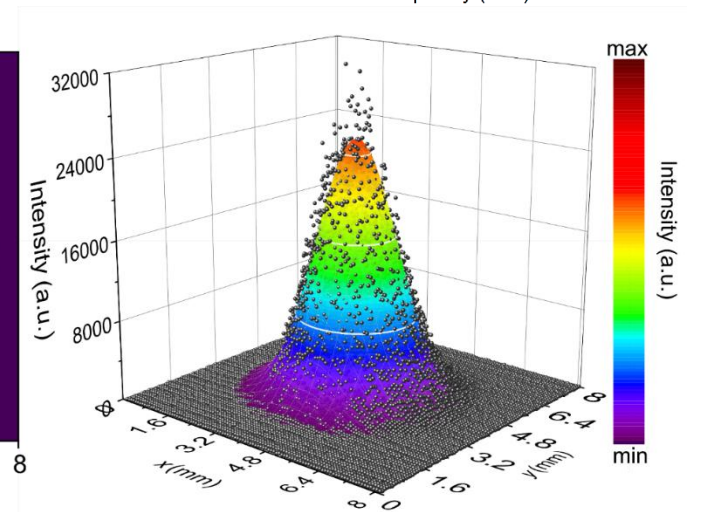
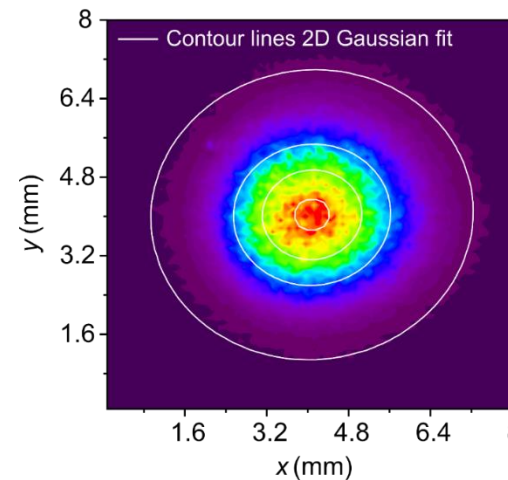
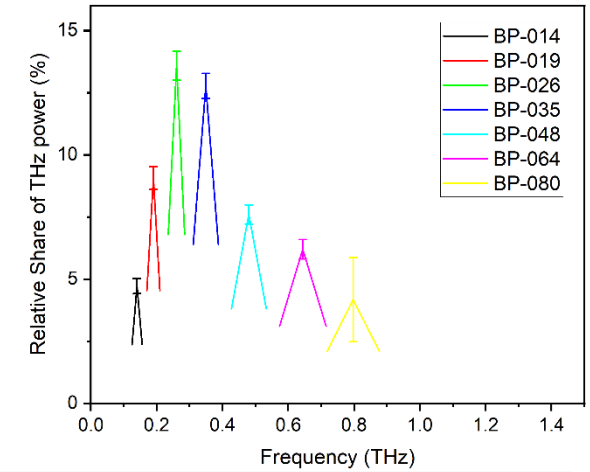
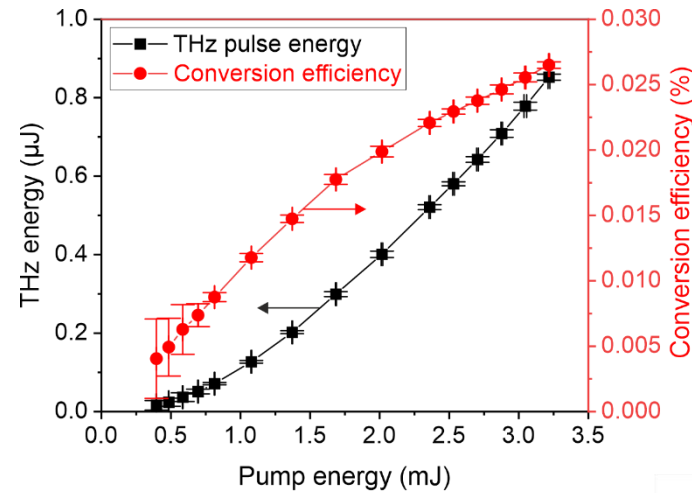
# SRR experiment – optical table and laser-based THz generation

Optical table:



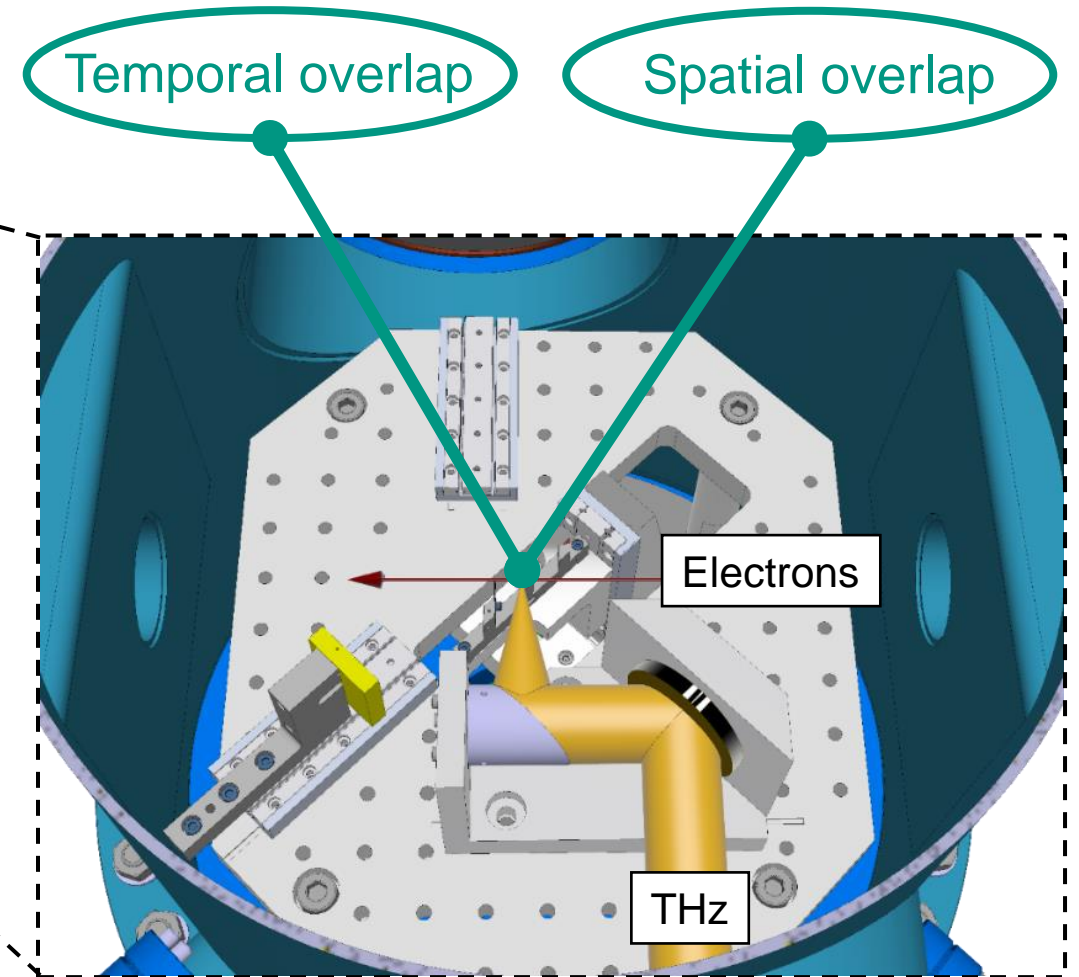
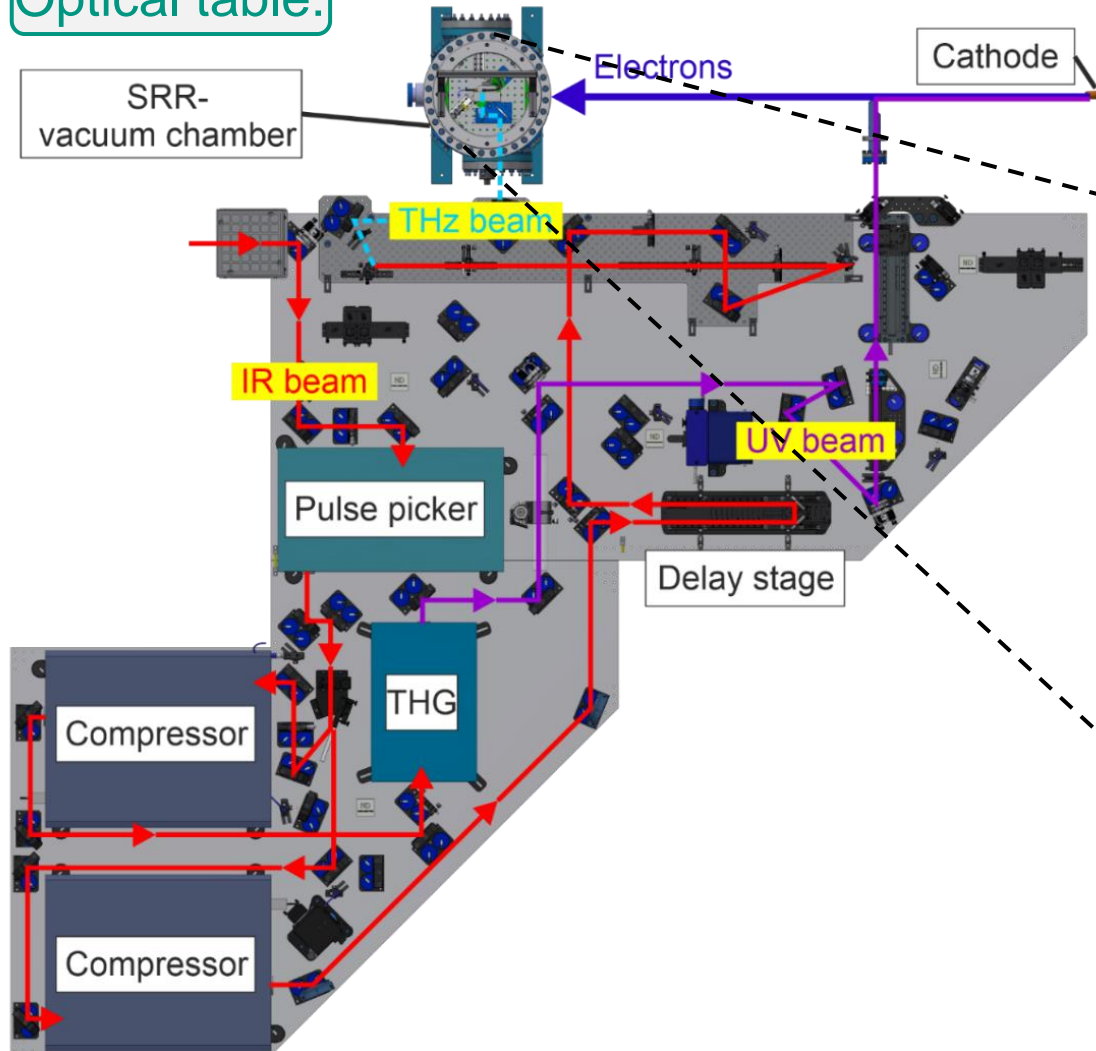
THz-radiation by Tilted-pulse-front pumping largely characterized!

THz generation:



# SRR experiment – optical table and vacuum chamber

Optical table:

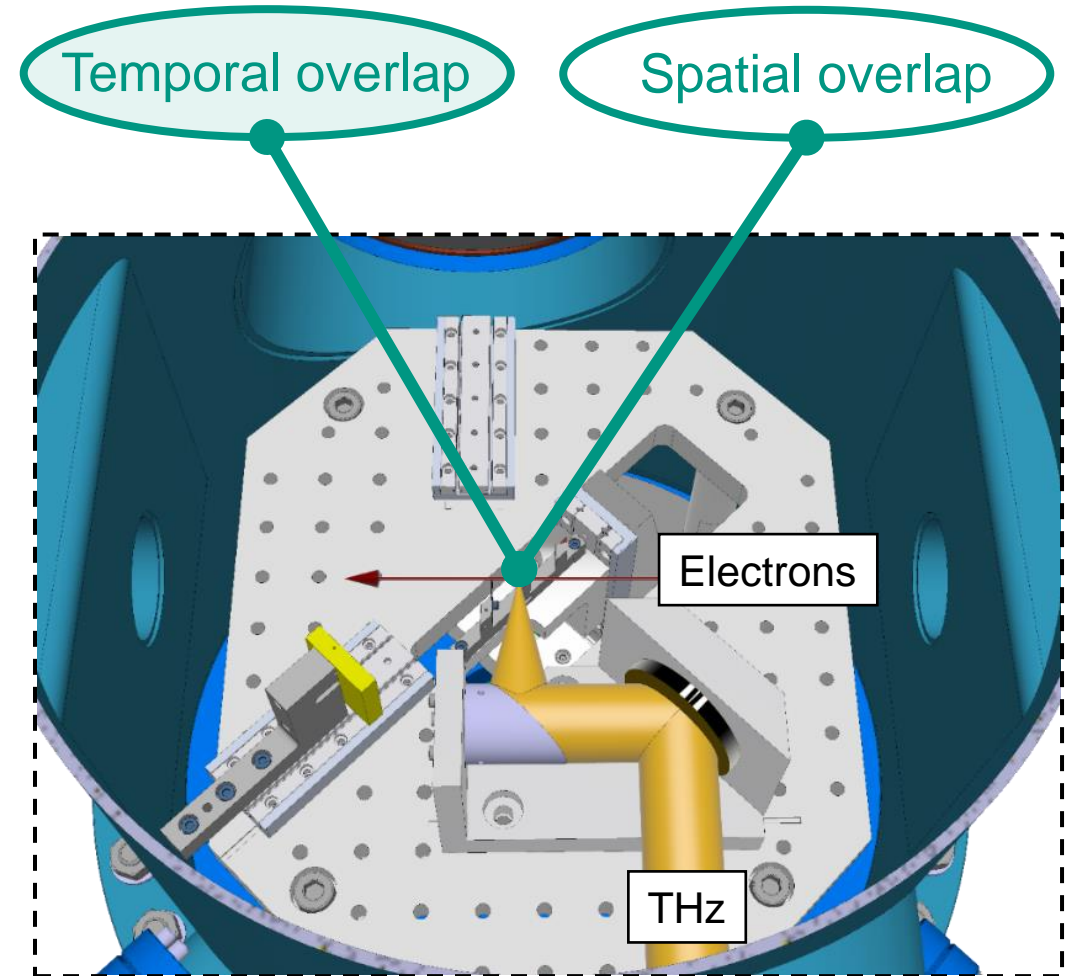
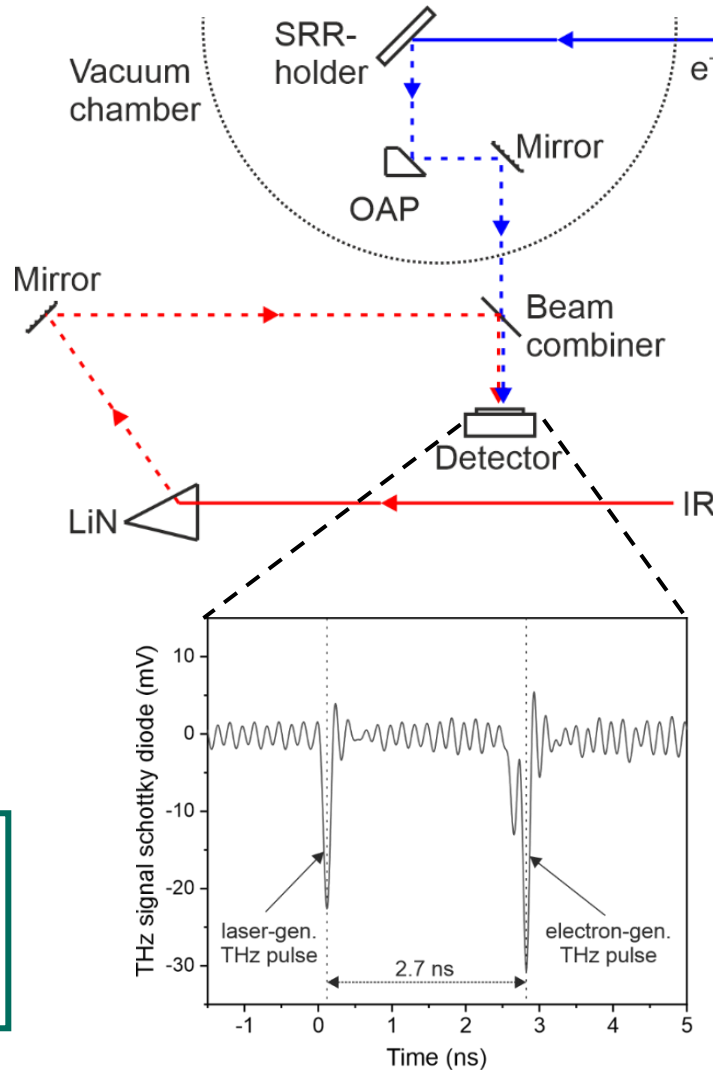


Courtesy: S. Schott



# SRR experiment – temporal overlap

- Both beams for photoinjection & THz generation have to match for **temporal overlap** at the SRR
- First electron-generated THz radiation at FLUTE!



Courtesy: S. Schott

➔ Temporal overlap experimentally preadjusted!



**Matthias Nabinger**

Doctoral researcher

Contact: [matthias.nabinger@kit.edu](mailto:matthias.nabinger@kit.edu)



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