

Research and Technology Center Detector Physics

FTD BONN



Center for Detector and Accelerator Research (CEDAR)

- hosts 10 Groups from 2 institutes from
 - High Energy & Hadron Physics
 - LHC: ALICE, ATLAS, LHCb
 - Belle II, COMPASS, CBELSA/TAPS
BGO-OD, ILC, PANDA , AMBER, NA64
 - RD42, RD50, RD53, RD51
 - Photonics



FTD building

- 2 local accelerators
 - electron stretcher ring ELSA (3.5 GeV e-)
 - cyclotron 15 MeV p (and ions)



ELSA



cyclotron

“In-house” test-beams and irradiation

Test-beam area at ELSA (PI)



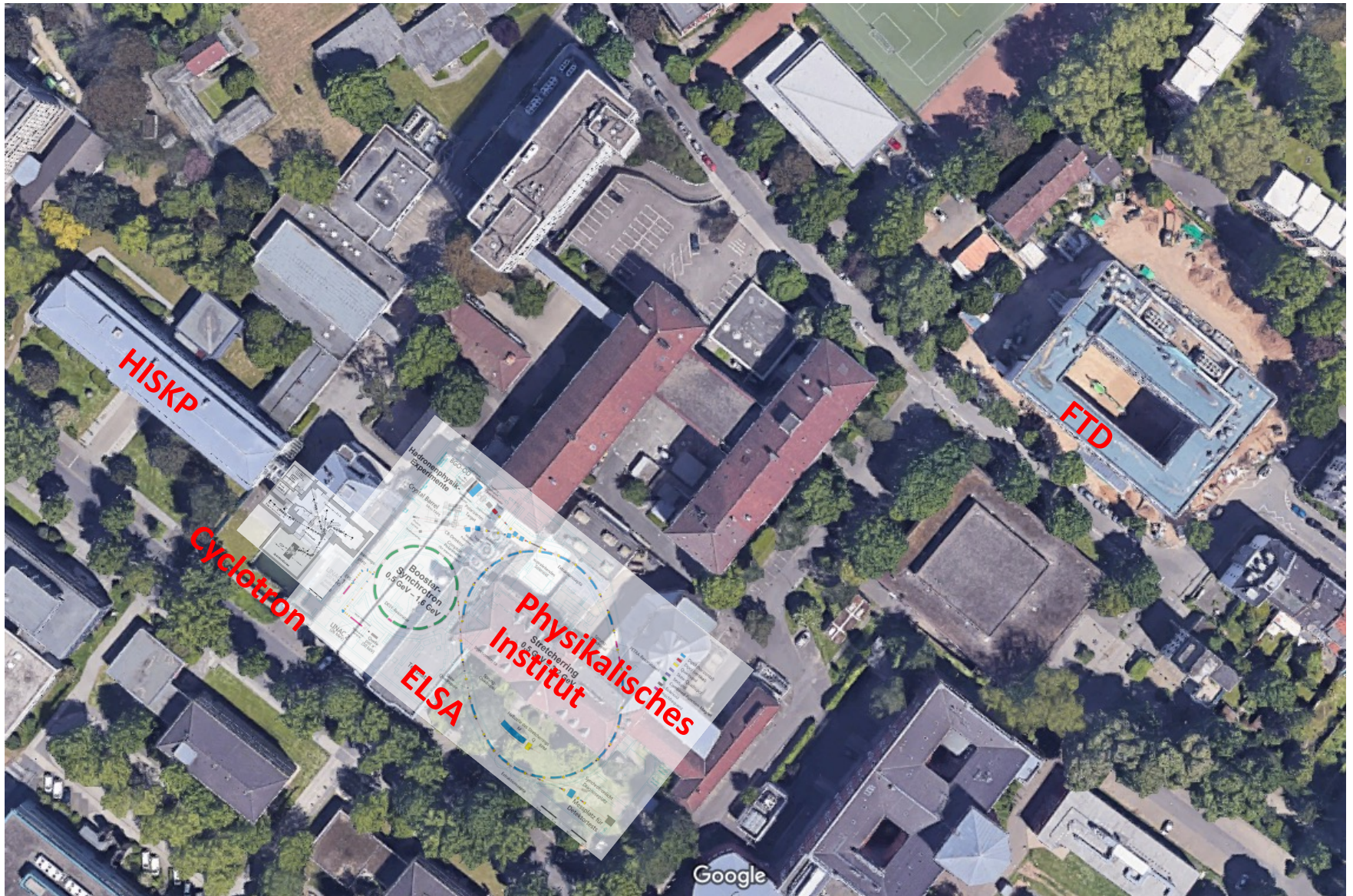
Proton cyclotron (HISKP)



Testing of detector components
in the ELSA electron beam

15 MeV p irradiation
 10^{16} n_{eq}/cm^2
in about 2 hrs

FTD aerial view



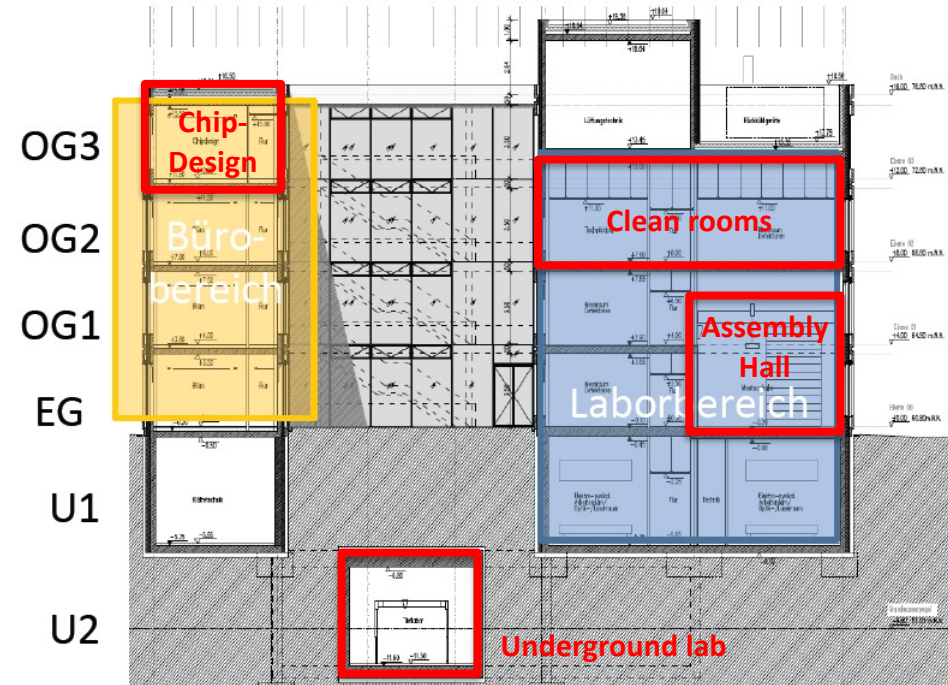
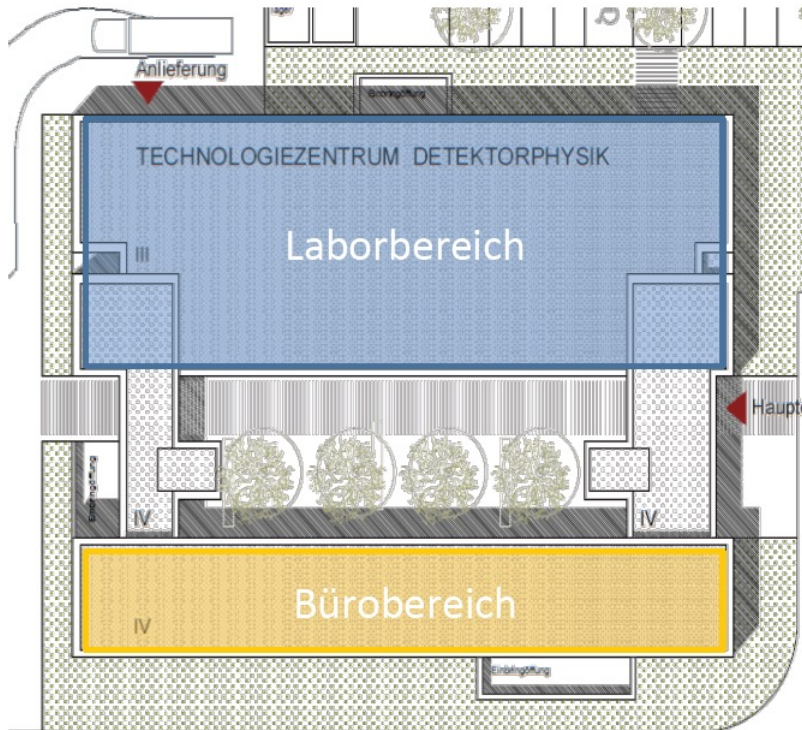
FTD building

Lab space

- 2010 m²
- 4 Levels + Underground Laboratory
- 360 m² clean rooms (ISO 5, 6, 7)

Office space:

- 880 m²
- 4 Levels



Impressions



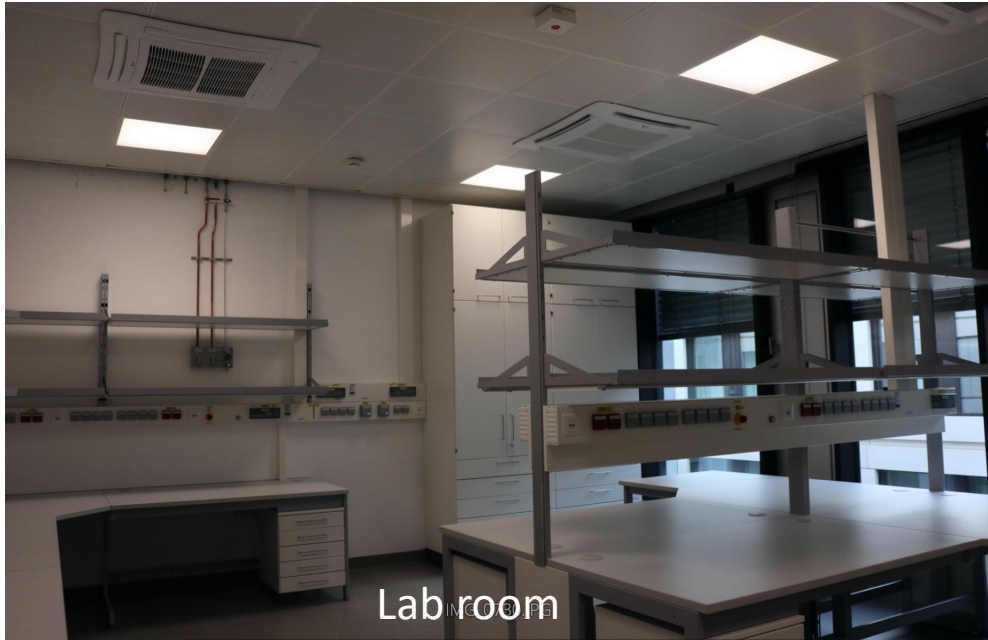
Main entrance

Impressions



Inner courtyard (atrium)

Impressions



Lab room



Office
IMG_0082.JPG



Chip design

Impressions



ISO-7 clean room

IMG_0740.JPG



IMG_0746.JPG



ISO-5 clean room

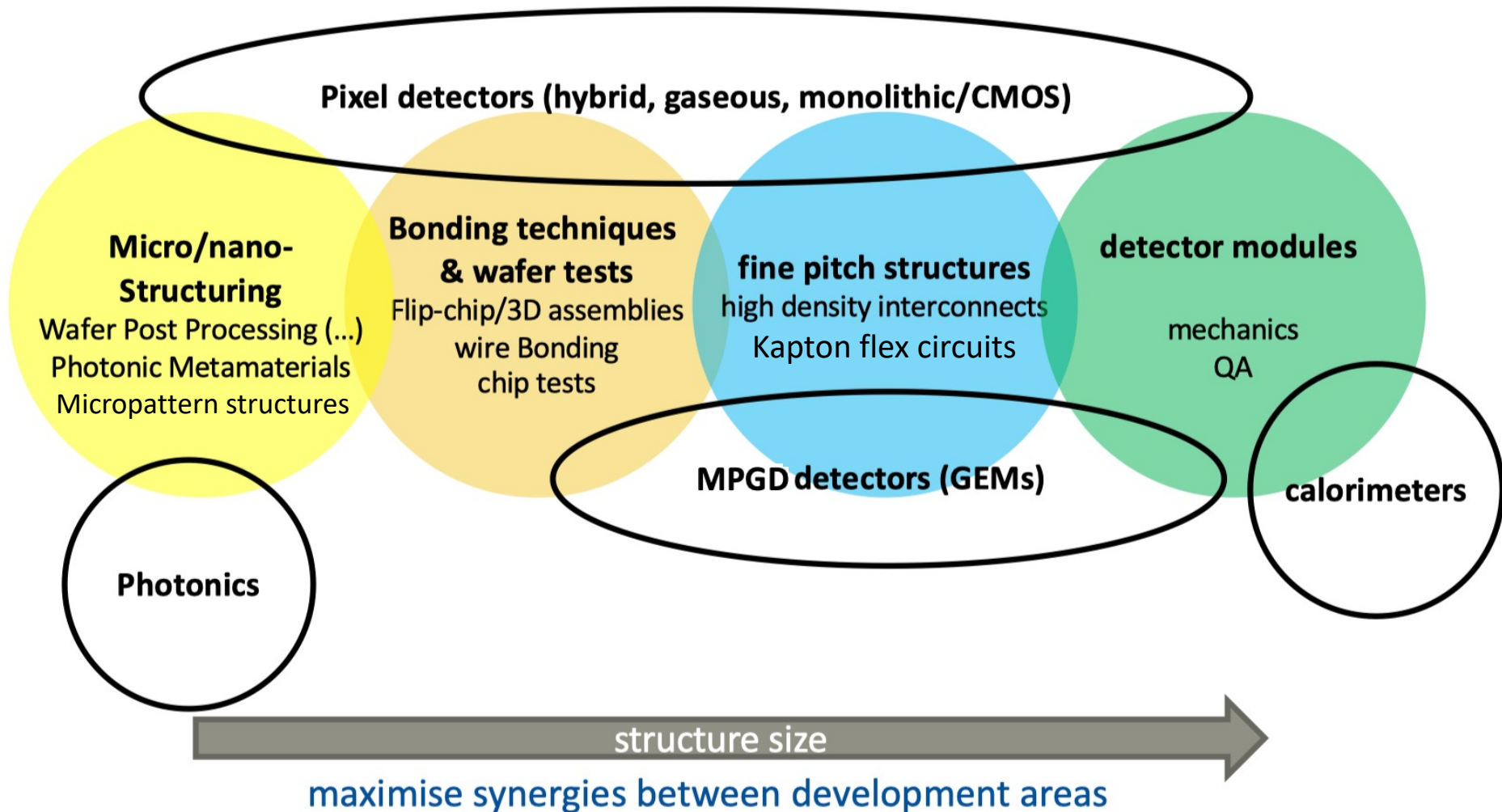
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Impressions

Assembly hall



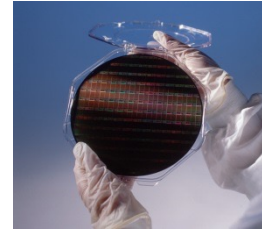
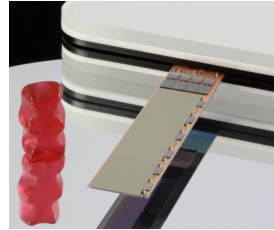
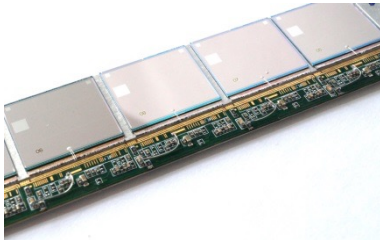
Target technologies and applications



Detector R&D at the FTD

Silicon pixel detectors

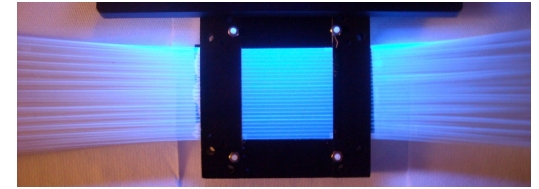
- ATLAS
- BELLE II



Chip design

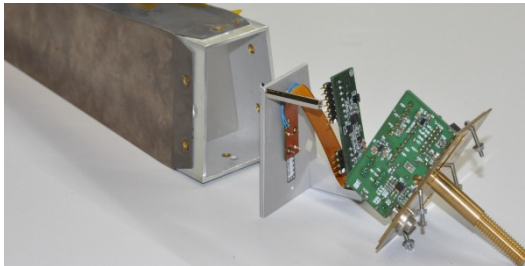
Scintillating fibers

- BGO-OD
- CB-ELSA
- COMPASS

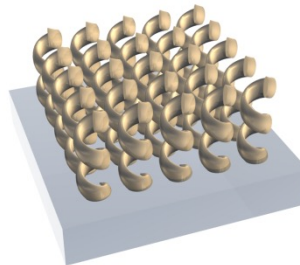


High-resolution calorimeters

- CB-ELSA
- PANDA

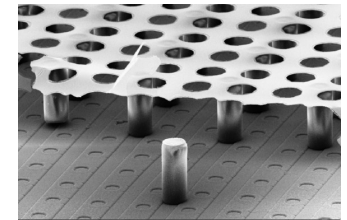
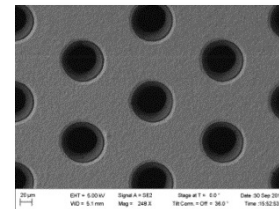


Optical antennas



Microstructured gas detectors

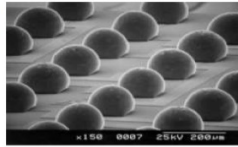
- ALICE
- ILC



New equipment

Solder ball placer

up to 8" wafers
pitch $\approx 100 \mu\text{m}$
min $\varnothing = 40 \mu\text{m}$



CR: PacTech

X-ray inspection

precision $< 1 \mu\text{m}$
scan area (20cm²)



CR: Nikon

wafers, ball-bonding and inspection

Wafer saw

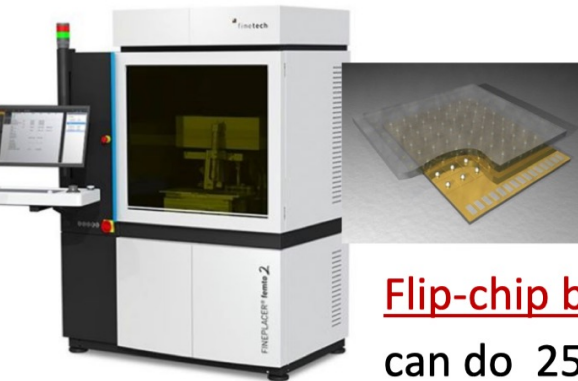
12" wafers



CR DISCO

Flip-chip bonder

can do $25 \mu\text{m}$ ($\rightarrow 10 \mu\text{m}$)
AgSn bumps with $< 1 \mu\text{m}$



CR FineTech

3D measuring machine

laser-based tracker
contact-less
1 μm resolution



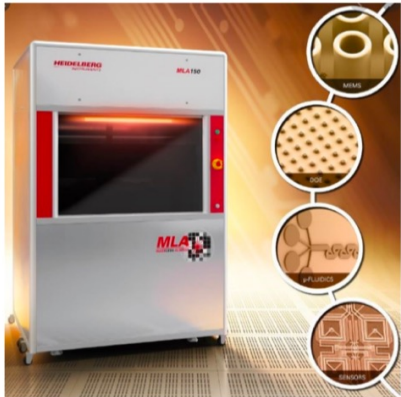
New equipment

Micro-structuring

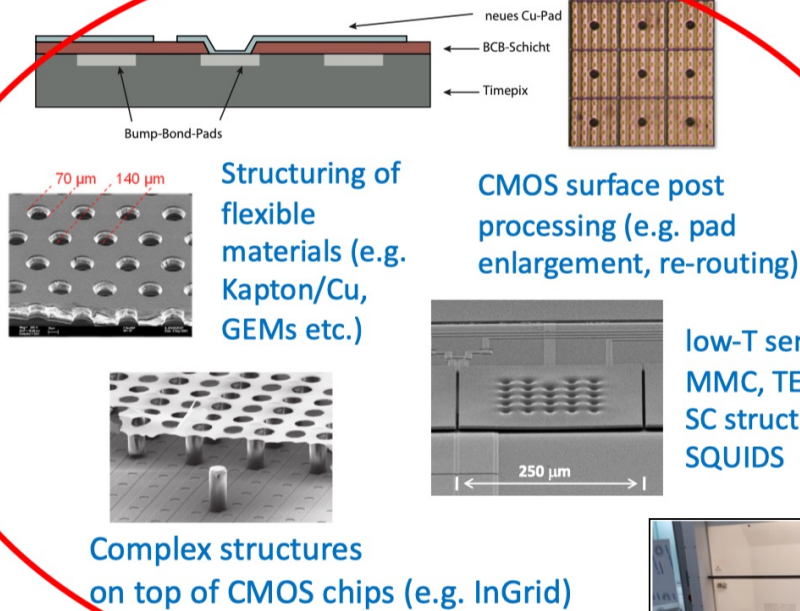
Plasma Etching



Maskless Aligner



3 wet benches for chemistry
and spin coating



Sputtering



Ion Etching





FORSCHUNG- UND
TECHNOLOGIEZENTRUM
DETEKTORPHYSIK

