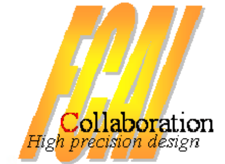


Molded Bump Foil
An approach to a compact frontend fanout

Hans Henschel, DESY Zeuthen

Molded Bumps Fanout

Aim & Requirements (Reminder)

- long-term stable and low-height contact between sensor and readout electronics

Materials:

- Gold (electrode of GaAs/Si sensor, coated track of pcb/flex pcb)

Geometry:

- 'coarse' grid (few mm)
- very small height (200 ... 500μm)
- 'long' distance to frontend electronics (max. sensor length)

Electrical:

- extremely low current
- HV safe (?)
- low crosstalk, low capacitance

Mechanical:

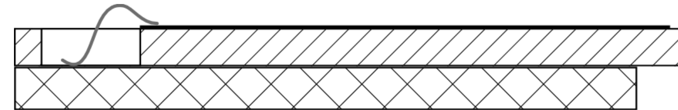
- even surface (~10μm)

Molded Bumps Fanout

Approaches

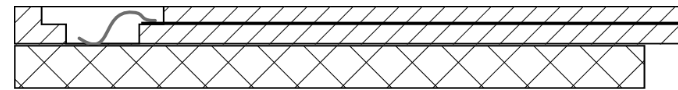
- **wire bonding**

  conventional, currently used, minimum height ~100μm (not measured)



- **flat loop wire bonding**

  staggered pcb required



- **conductive glue**

  tested in Krakow (?), not satisfying …

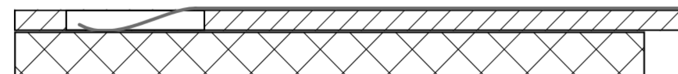
- **laser bonding**

  first enquiries by TAU

- **tape automated** (TAB) **bonding**

  first enquiries by TAU

  bonding wedge & dedicated fanout sample ordered

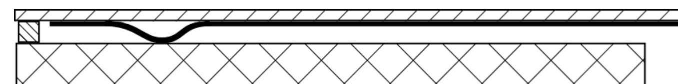


- **spring loaded contact**

  technology tests by ZEUTHEN

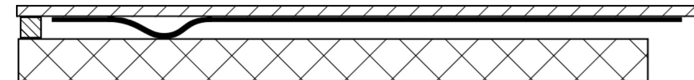
  molding tool fabricated

  dedicated fanout delivered and tested



Spring Loaded Contact (Reminder)

- semi-flex pcb
- contacts are molded bumps (compare contacts of small size push button)



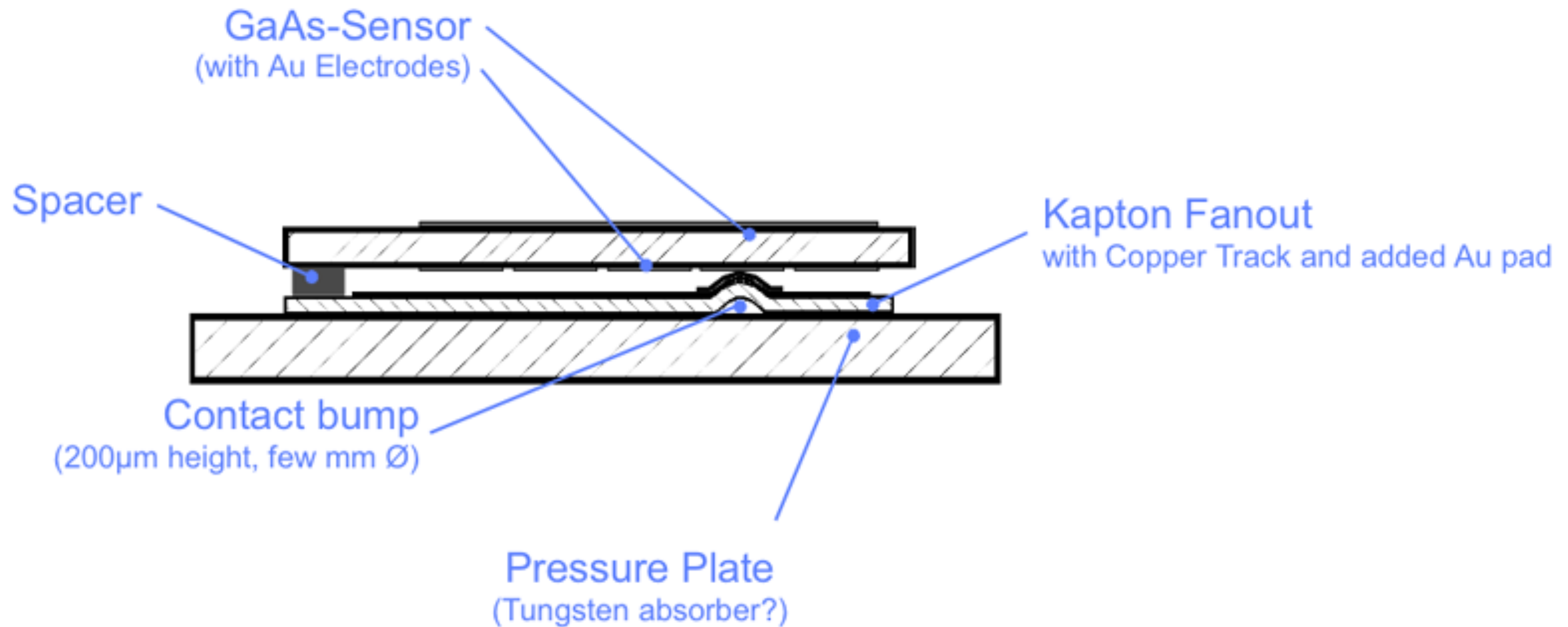
Advantages:

- assembly without thermal treatment
- robust against thermal impact and concussion
- residue-free removal
- easy exchange of either parts

Disadvantage:

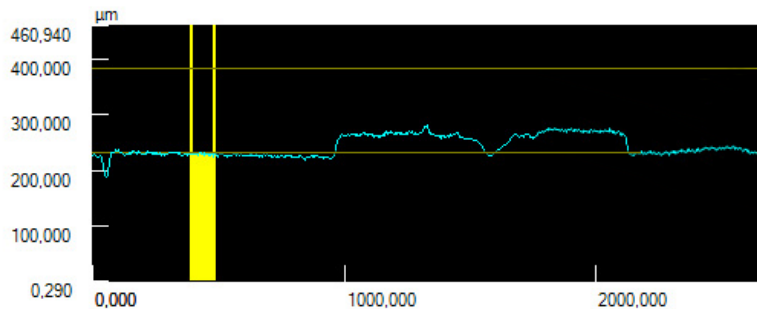
- tight requirements for surface flatness and parallelism
- contact force to be permanently maintained (spacer required)

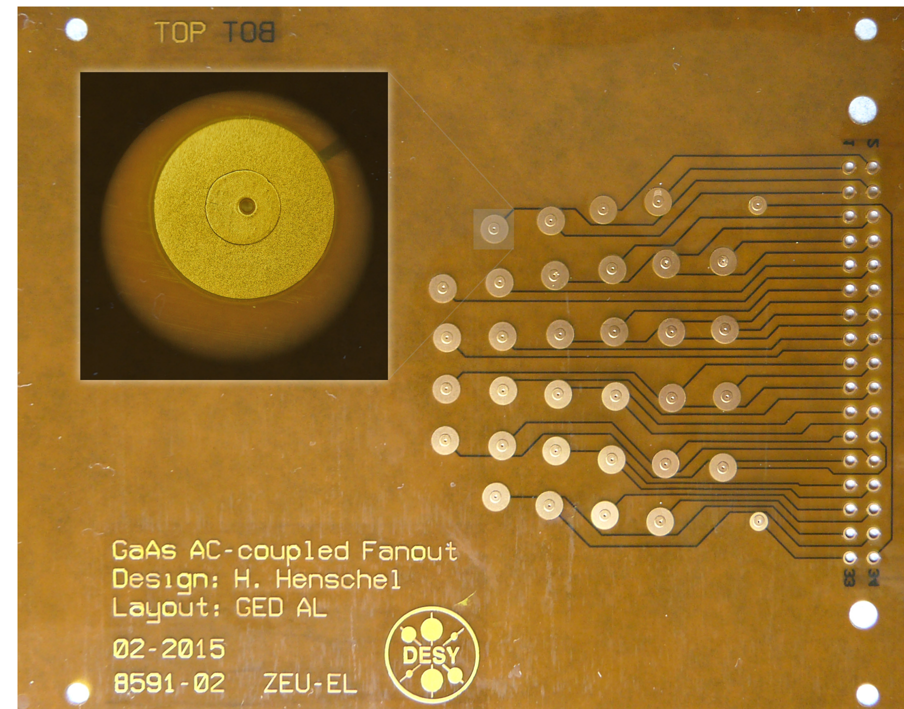
Spring Loaded Contact (template #1)



Spring Loaded Contact (template #1)

- Sample production at German company
- Standard 2-sided flex pcb with galvanic Au coating (50μm)
- Contacts **NOT** spring loaded! Just embossed
- Layout mistake (placement of pads)
- Laser survey



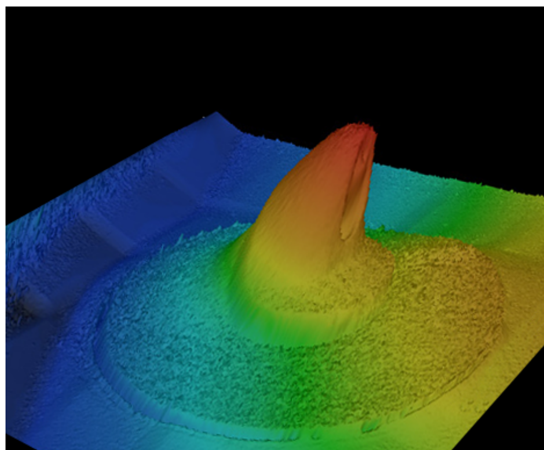


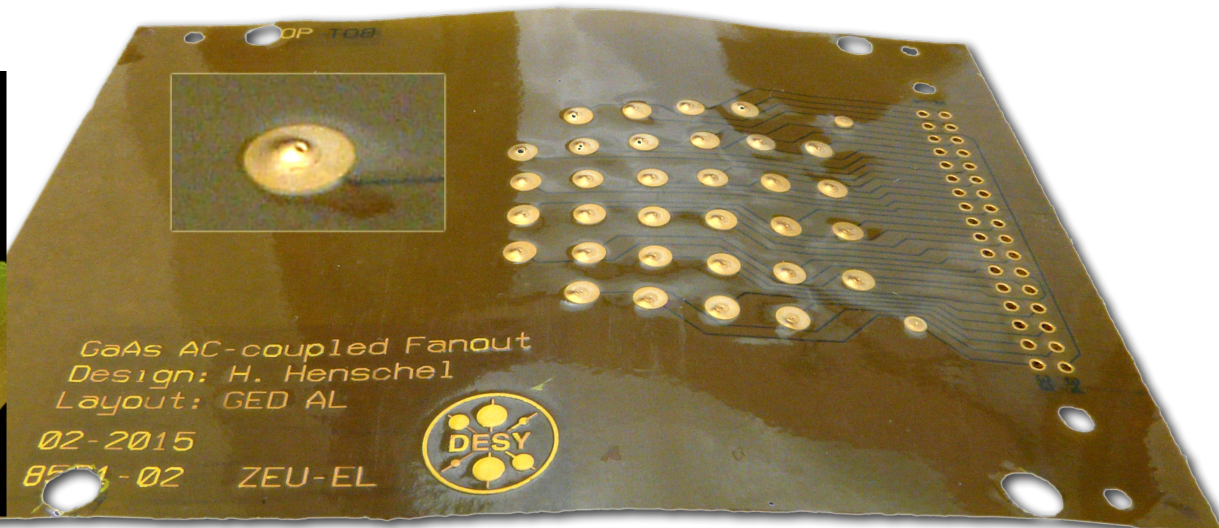
Molded Bumps Fanout

Molding (template #1)

- 2-piece Molding tool (Zeuthen workshop)
- 32 molded pads (though peak partially misaligned*)
- peak height 240μm

**) company used wrong dxf data*

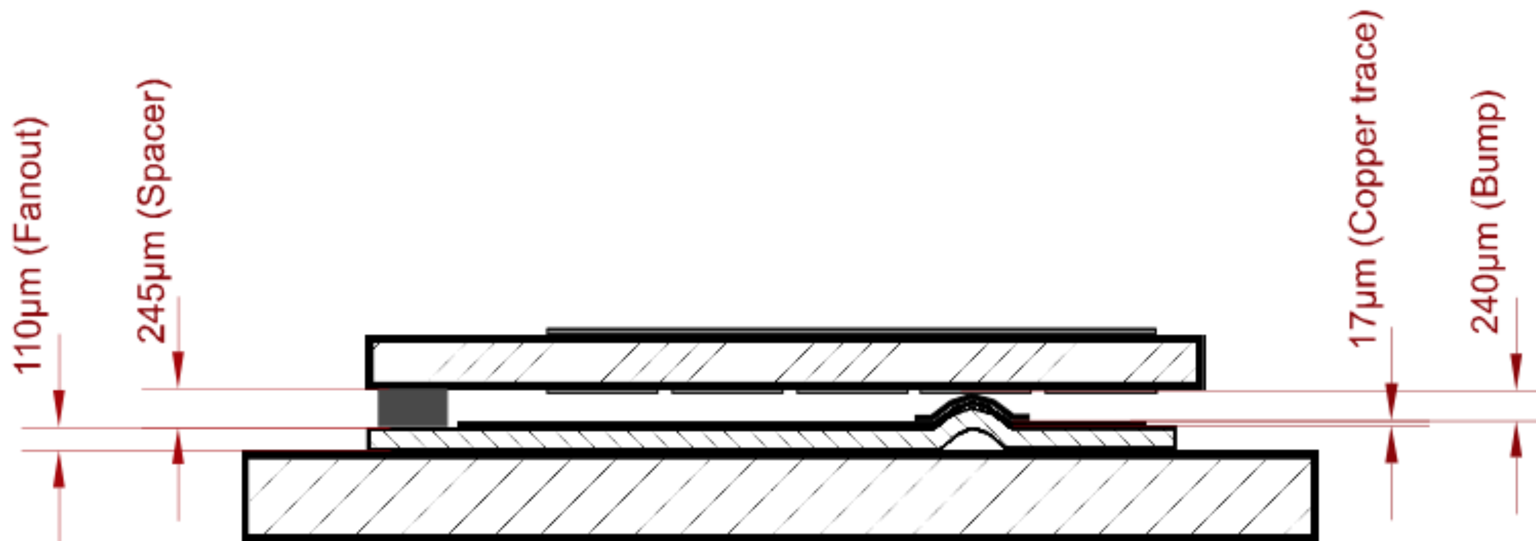




Molded Bumps Fanout

Measurement

- Dimensions:



Molded Bumps Fanout

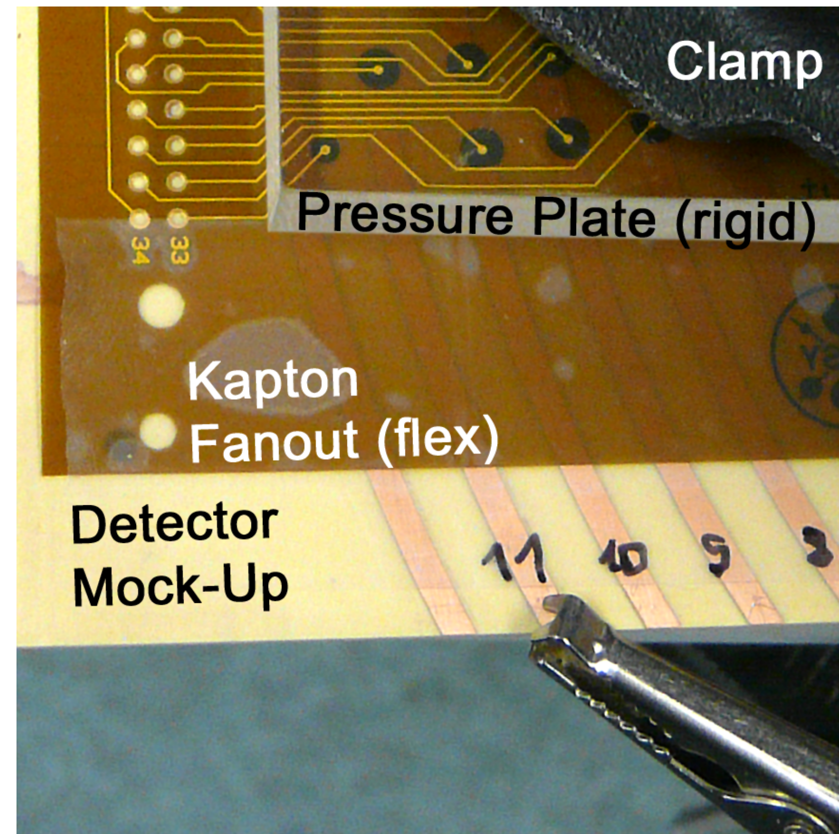
Measurement

- Electrical:
  Contact Resistance for different pressure and a series of clampings
  (thanks to Lucia!)

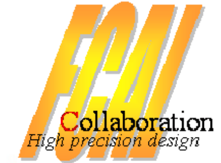
[Ω, averaged]

Contact Resistance GED-Fanout

	Sector 1	2	3	4	5	6
Ring 11		0.38	0.38	0.34	0.33	
10	0.38	0.38	0.37	0.38	0.38	0.40
9	0.40	0.38	0.38	0.38	0.37	0.40
8	0.38	0.38	0.38	0.38	0.40	0.38
7	0.47	0.40	0.38	0.37	0.37	0.42
6		0.38	0.42	0.40	0.42	
Min	0.333					
	0.356					
	0.400					
Max	0.467					



Molded Bumps Fanout



Next steps

- Order a second template (full size - 64 contacts?)
- Use original GaAs sensor (Au sputtering under way)
- Use a thin pressure plate with spacer frame