

A close-up photograph of a ladder cable tray. The tray is made of dark grey metal and contains several rows of blue cables. Each cable is secured with a blue plastic connector. The cables are arranged in a neat, parallel fashion. The background is slightly blurred, showing more of the tray structure.

Mu3e ladder construction

Current status

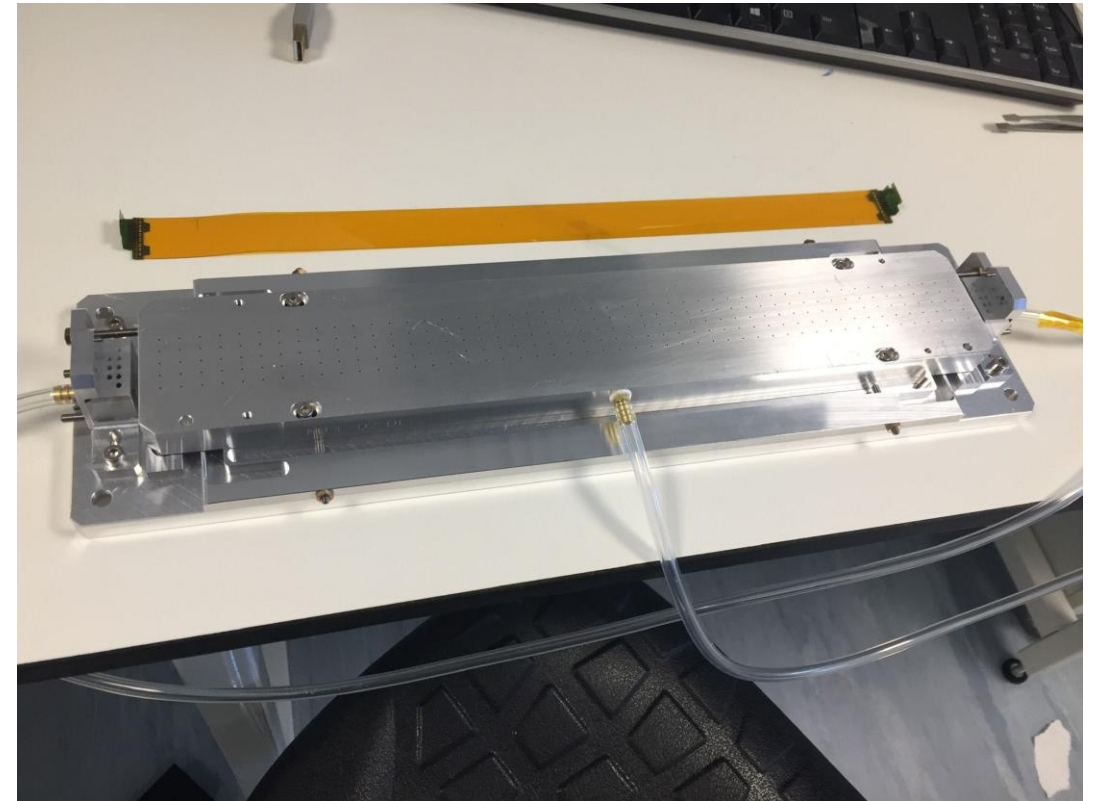
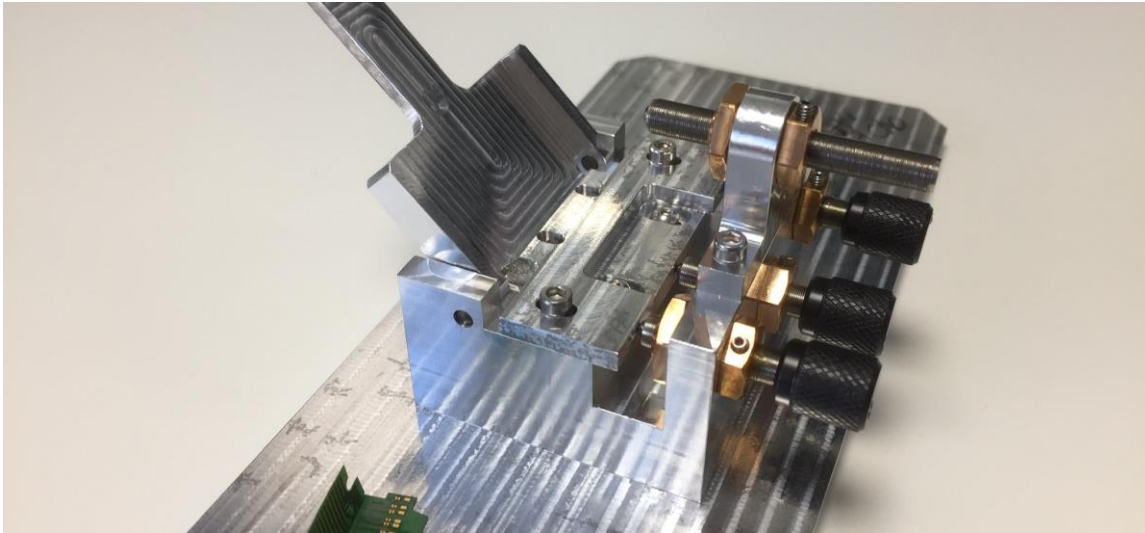
A.Loreti on behalf of OPMD, Oxford

List of topics

1. New tooling for the construction of silicon heater ladders.
2. Mock-up ladders.
3. Roadmap towards silicon ladder production.
4. Mupix10 tooling.

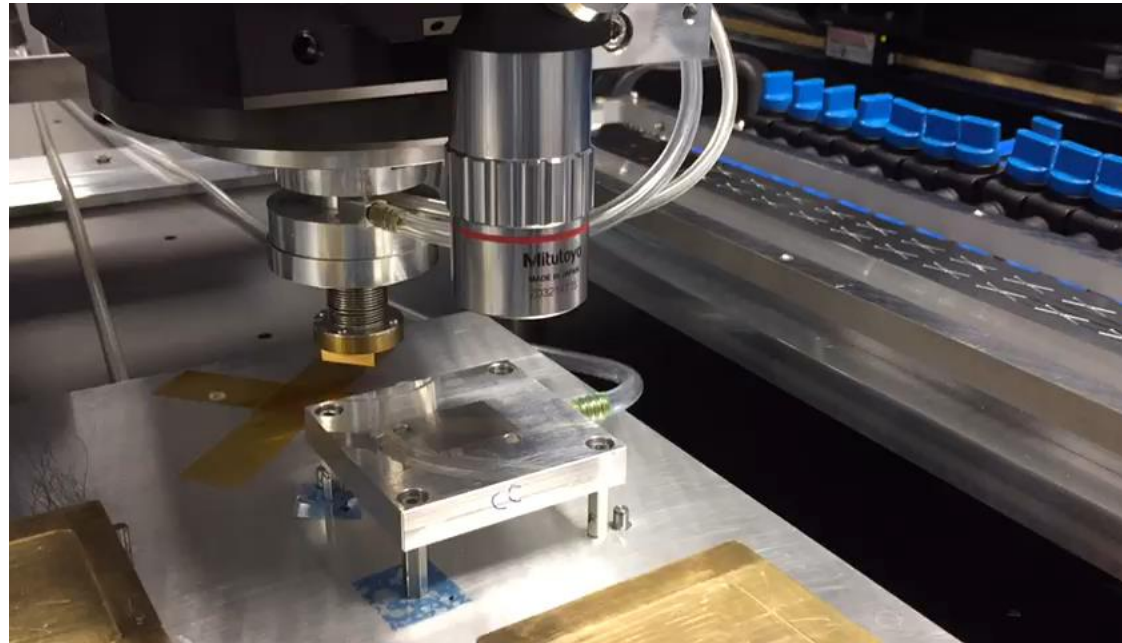
Bending jig & Alignment chuck

- The jig bends the flex-interposer at 90° .
- The HDI-flex and flex-interposer are vacuumed down onto the chuck and interposer blocks.
- The flex-interposer and the HDI-flex can be aligned by means of adjustable screws.



Chip-chuck & Gantry robot

- Chips are picked up by the gantry pick-up tool and moved to the chip-chuck
- Precision achieved so far: 10um

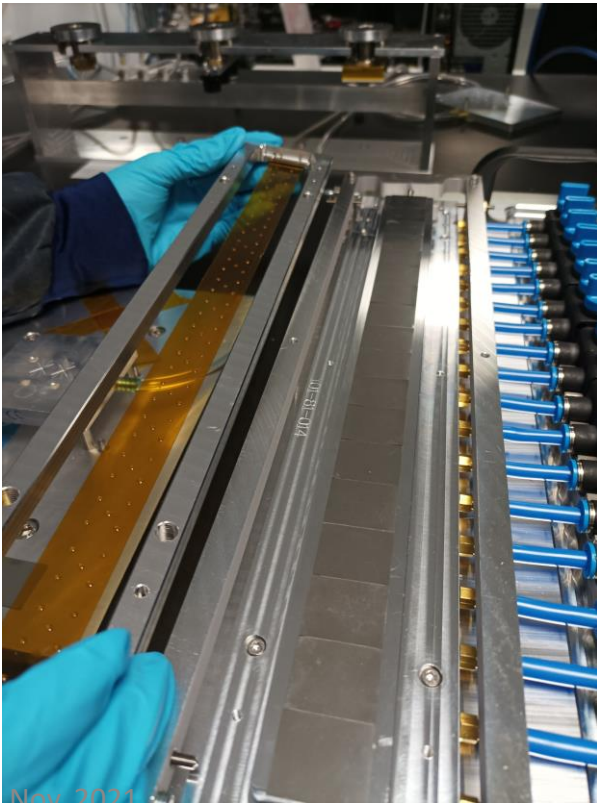


Chip-chuck & Gantry robot



- Once all chips are aligned, the whole system (base plate + chip-chuck) is moved to the glue robot. During the transport, an external pump allows to keep the vacuum conditions.

Chip-chuck & Gantry robot

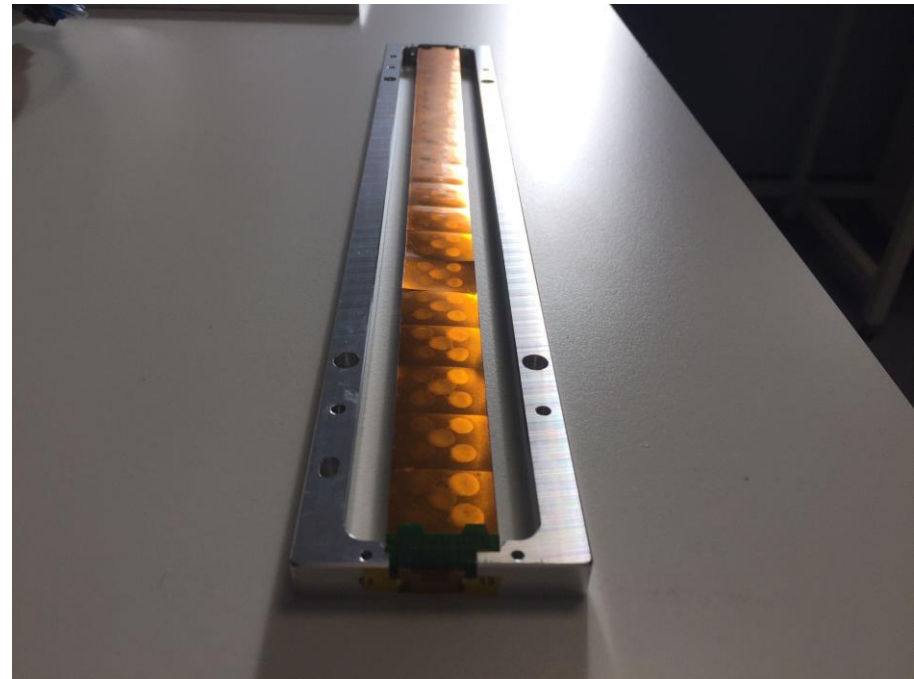


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- Once all chips are aligned, the whole system (base plate + chip-chuck) is moved to the glue robot. During the transport, an external pump allows to keep the vacuum conditions.
- Glue is applied onto the chips (or directly onto the flex as for the 2 mock ladders we have made).
- In both cases, the position of the ring frame holding the HDI-flex can be adjusted via fine-pitched screws.

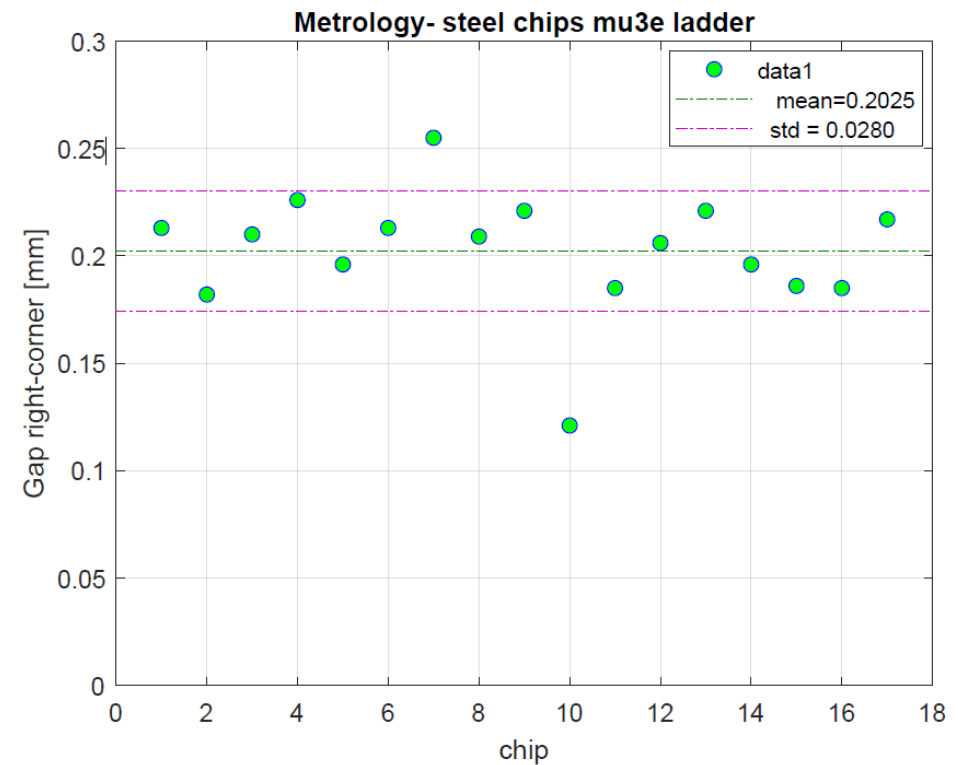
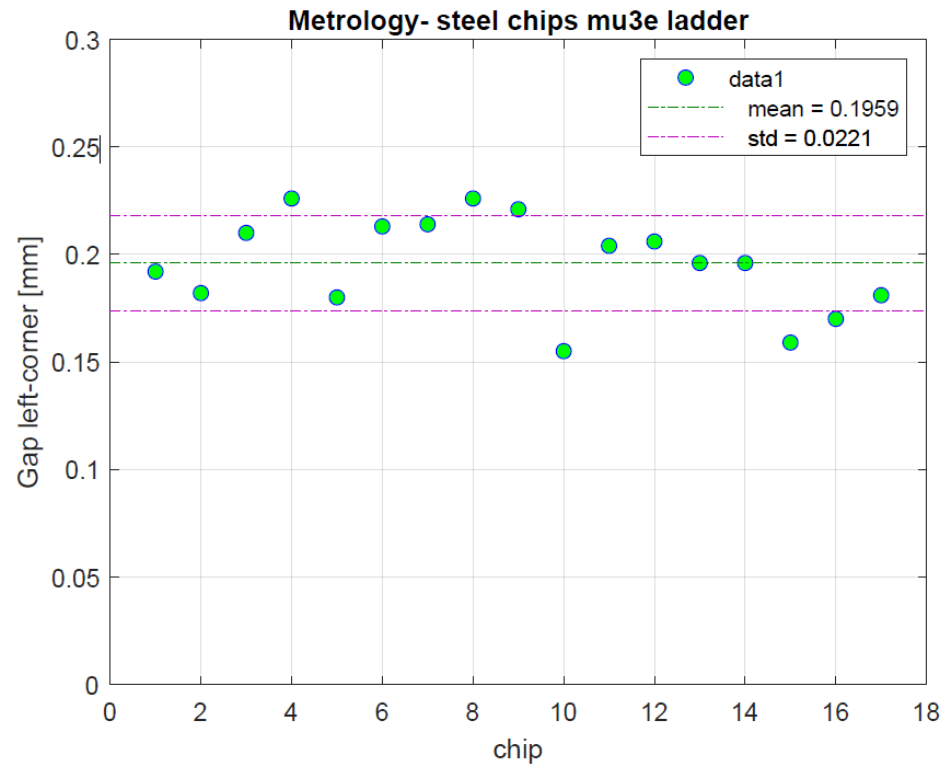
Two mock ladders

- Two mock ladders have been made by using Kapton tapes resembling the Si ones.
- Eighteen steel chips have been used (23x19.8)mm² with thickness 50um.
- V-folds are coming next.



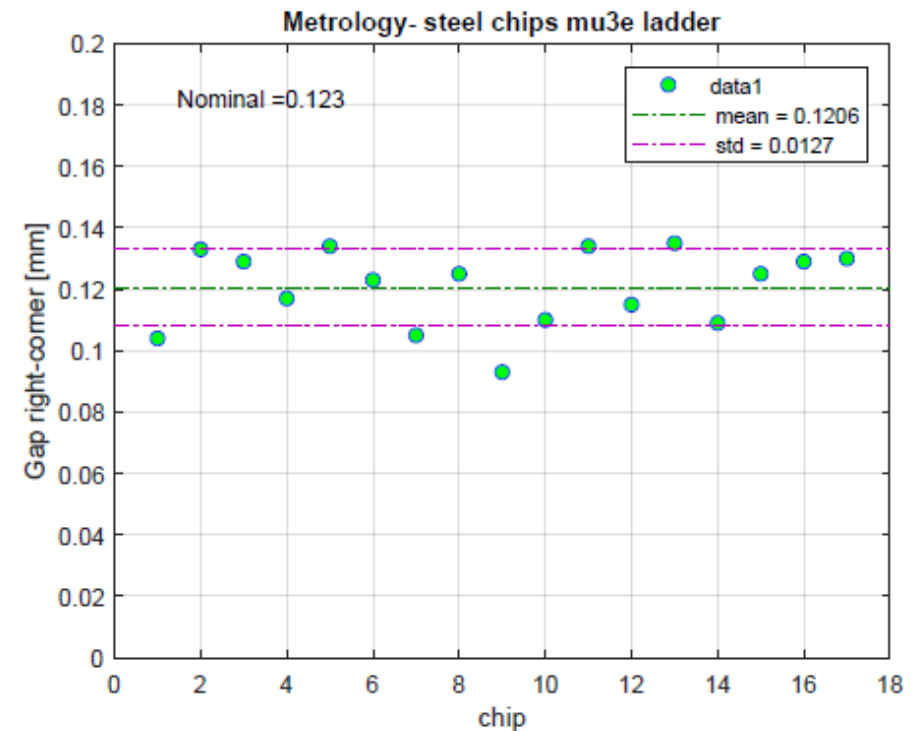
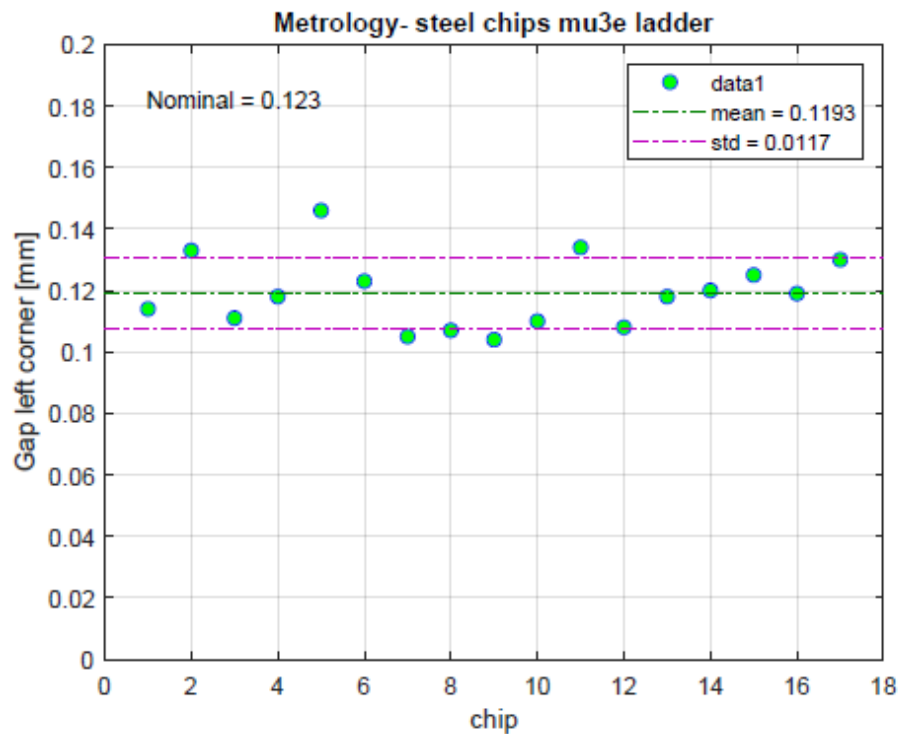
Two mock ladders

- Mock ladders were produced by setting a gap of 0.203mm.
- Because some of the chips were bent, some errors were generated during the measurements.



Silicon chips alignment

- Si chips 23mm wide, length = (19.93 ± 0.003) mm.
- Gap set at 0.123mm, precision 10 μ m.
- New Si chip alignment, gap 50 μ m, is on the chuck today.



Roadmap towards Si ladders

- All the tooling required has arrived.
- Minor changes to the current V-fold module are needed.
- First Si ladders should be ready in December.

As soon as the V-fold module has been prepared to accommodate Si flexes, we can start building them.

In principle, we can already attach interposer-flexes to the Si-tape (the tooling is there, and it has been tested with on 2 mock tapes).

We can align Si chips with the required precision with the gantry.

New tooling for Mupix ladders

- Mupix 10 HDI-flexes will arrive in November.

- Mupix 10 tooling has not been designed yet however, it does not need to be developed from scratch.
- The new tooling will follow the design of the Si tooling with minor corrections to account for the different flex sizes. I would like to discuss this before Christmas vacation.
- First, we want to acquire experience with Si ladders. The current system is our benchmark to test the present design before moving on to Mupix tooling.

THANK YOU!