

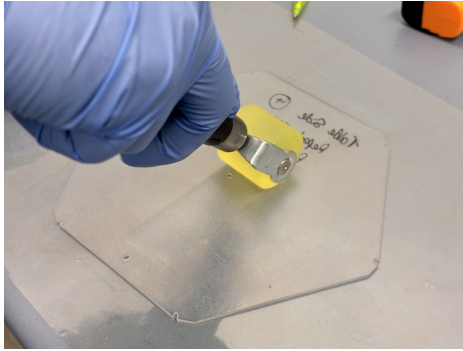
HGCAL Baseplate Full Glue Qualification Proposal

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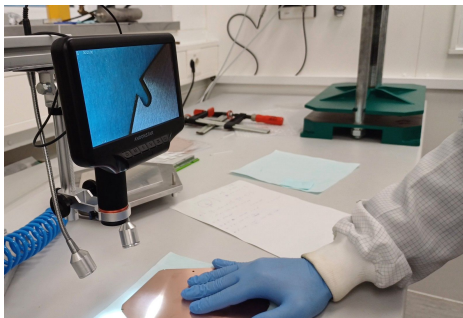


Under Development: Full gluing scheme

1. Spread glue with roller

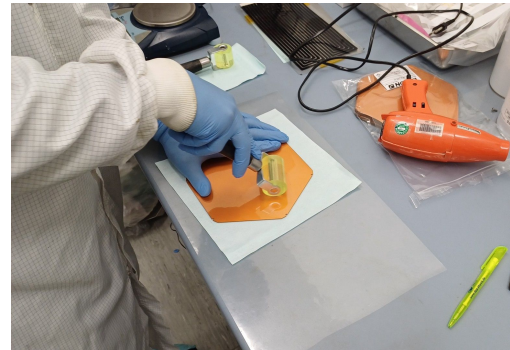


2. Apply kapton



3. Adjust kapton into place under microscope

4. Roll to spread glue evenly



Glue:
Araldite 2011

5. Check alignment again (adjust if needed)

6. Place weight on top

7. Cure

... and ... voila!

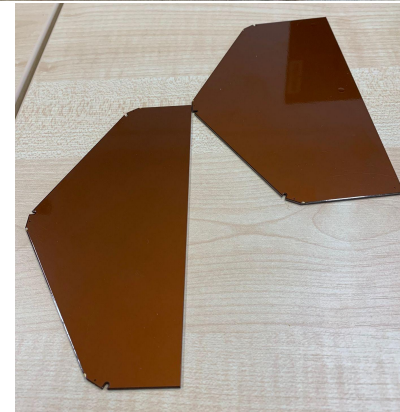
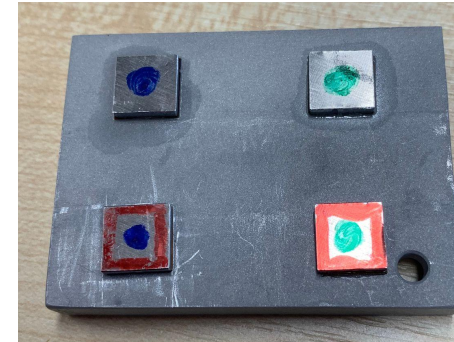


Laminated Baseplate

The Past: Kapton and glue irradiation tests

■ Kapton irradiation

- Irradiated 4 kapton foil pieces to 0.5 MGy using X-rays
- Pull-test performed on irradiated kapton pieces -> no kapton separation observed up to 5 MPa
- Shear-test performed on 2 irradiated samples:
 - Shear stress applied was > 6 MPa -> no kapton foil separation observed



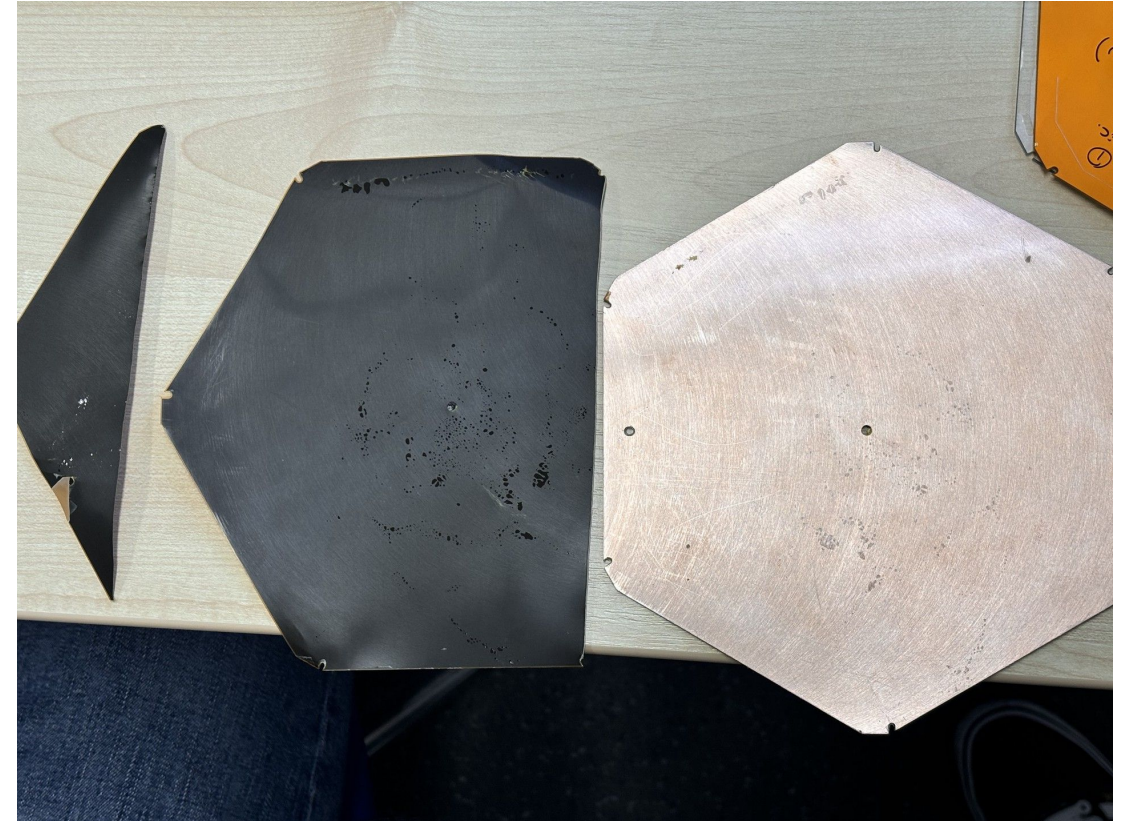
■ Irradiation of epoxy used for kapton foil lamination produced at IHEP

- Full module baseplate was cut in 2 pieces by waterjet cutter
- Irradiation campaign planned at CIEMAT
- Peel-test will probably be done at CERN

Qualification of Full Glue Method

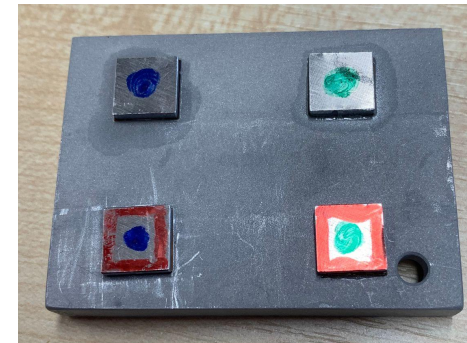
- **Concerning observations:**
 - Kapton-glue-CuW interface might not be as strong as thought
 - No existing test, many **gut** instincts
- **My experience with GEM**
 - Pre-production “of course that will work” un-quantified changes caused issues that created disasters for GE11
 - ME0 learned from experience
 - *We are in exactly the same position!*

We must be precise and methodical

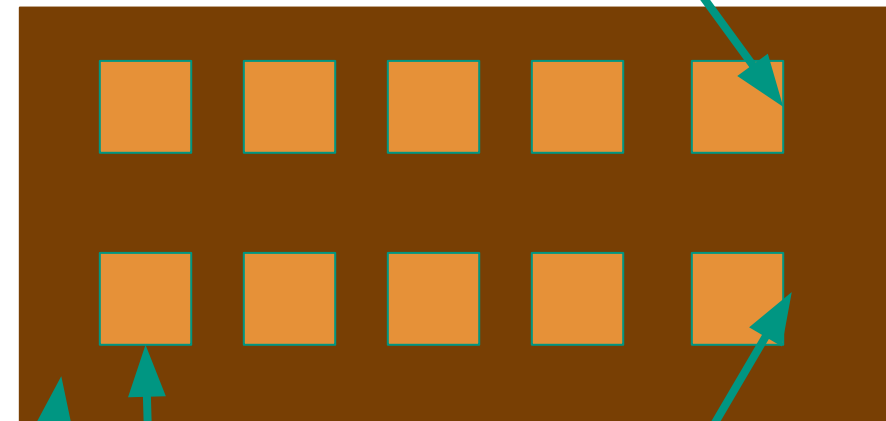


Qualification Proposal

- Sand top part of Kapton
- Sand aluminium block
- Glue large piece of Kapton to aluminium with the sanded pieces glued together
 - (Also sanded in previous test)
- Place small pieces of CuW on large area, un-sanded Kapton surface
 - $\leq 0.5 \times 0.5$ cm pieces
- Vary the glue thickness 50 μm (spec) 30 μm (Alexander suggestion)
 - Multiple trials of each!
- Send to Stefano for peel test!



Row with 50 μm araldite



Sanded aluminium underneath

other side of kapton sanded

CuW

Kapton sheet

Row with 30 μm araldite

Conclusions

■ Open questions:

- How bad are the air bubbles?
- What forces must the Kapton-glue-CuW(Ti) withstand? (Stefano and Suzanne)
- I am very occupied now, so is Stefan, so is Maria, I think we need to hand this task off (I can advise of course)

■ My suggestions: *Need input from Stefan and Benny on mechanics of designing the test*

- Perform tests
- Present variations and test results to HGICAL
- Emphasize that 30 um is below glue specs but (if tests are good) may be enough
- Emphasize testing should also be done by others
- Emphasize that araldite bonds differently to different materials and should be tested for each that is considered

Let's make HGICAL a fantastic detector with baseplates that last the lifetime of the HL-LHC!