# FDM read out assembly with flexible, superconducting connection to cryogenic kilo-pixel TES detectors

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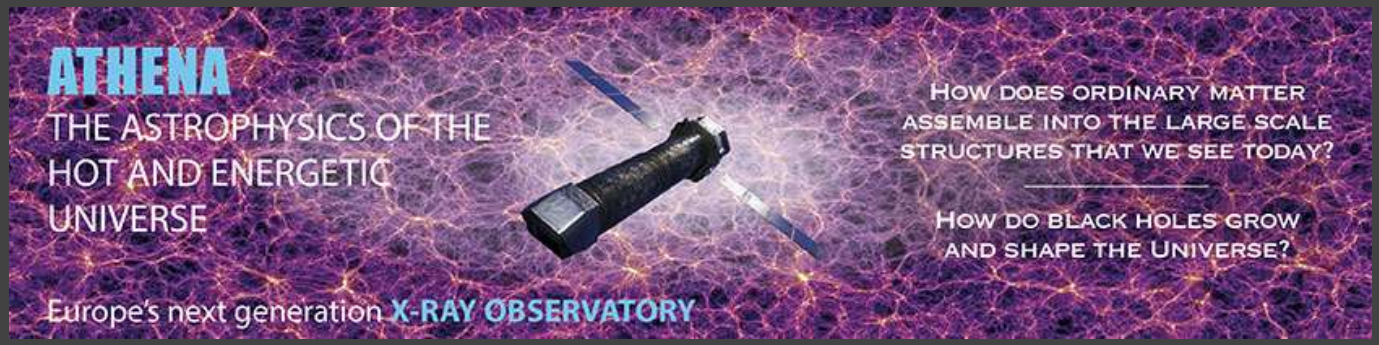
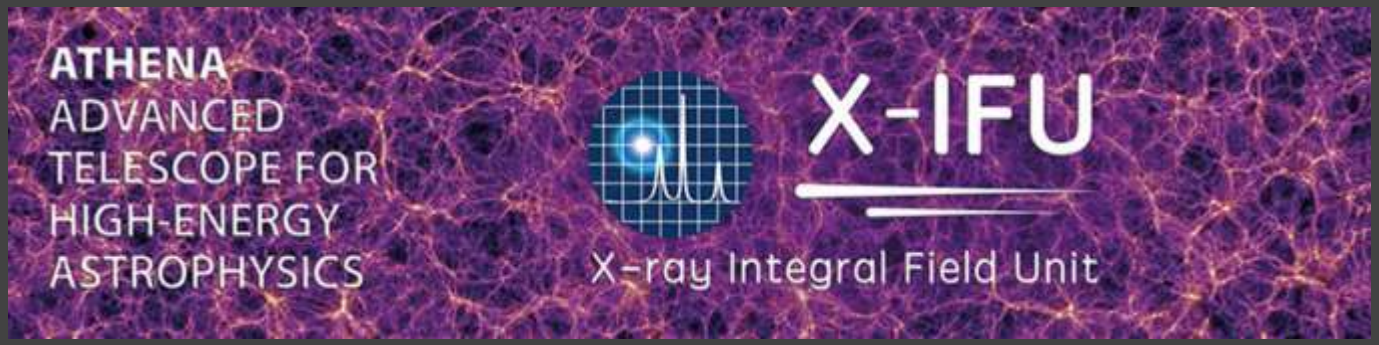
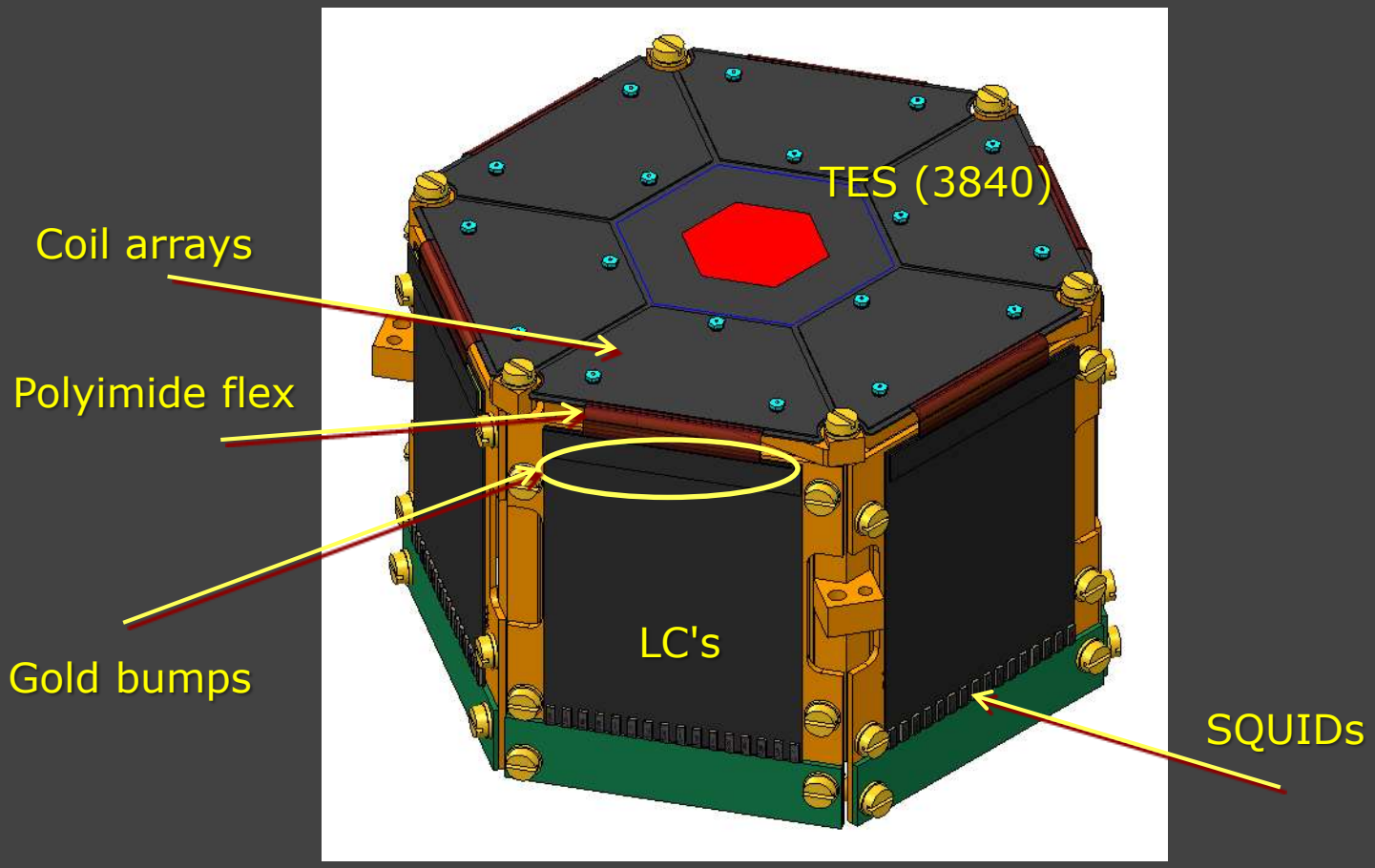



LTD-16, Grenoble

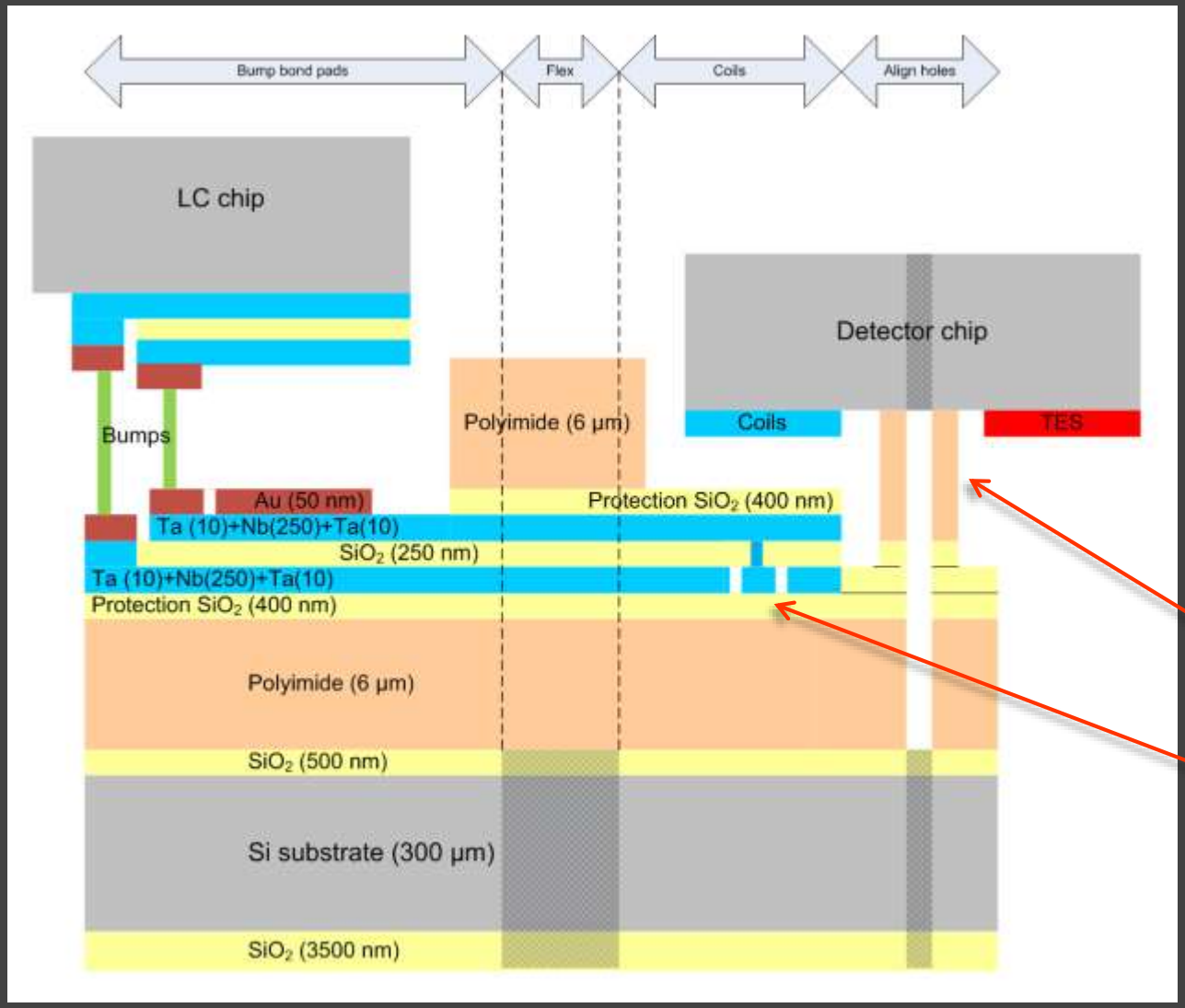



SRON

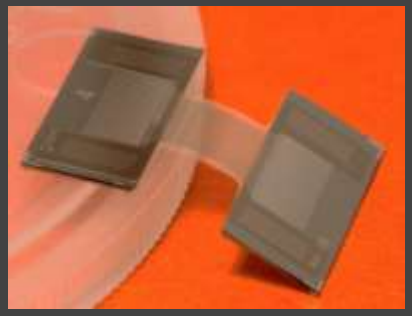
# Flexible connection between TES & LC filter

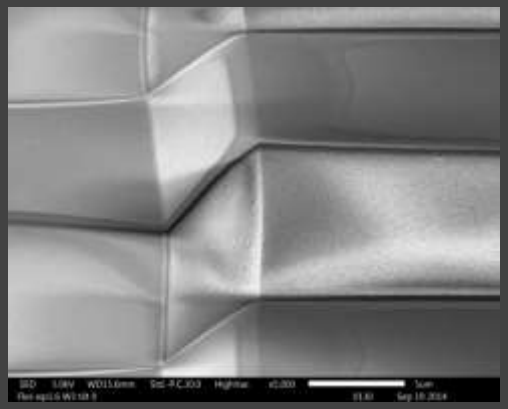


# Schematic process

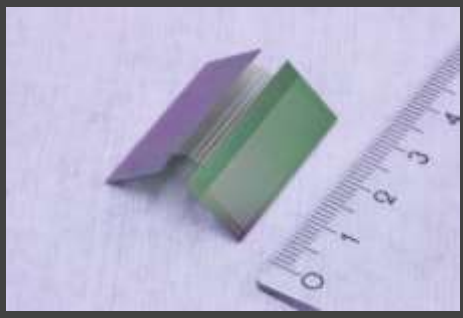


# Prototype flex chips



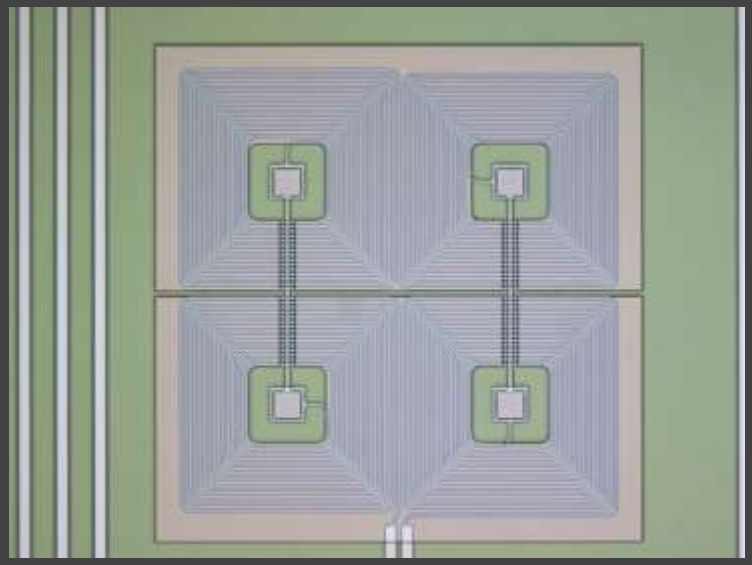


Nb lines on 6 µm PI

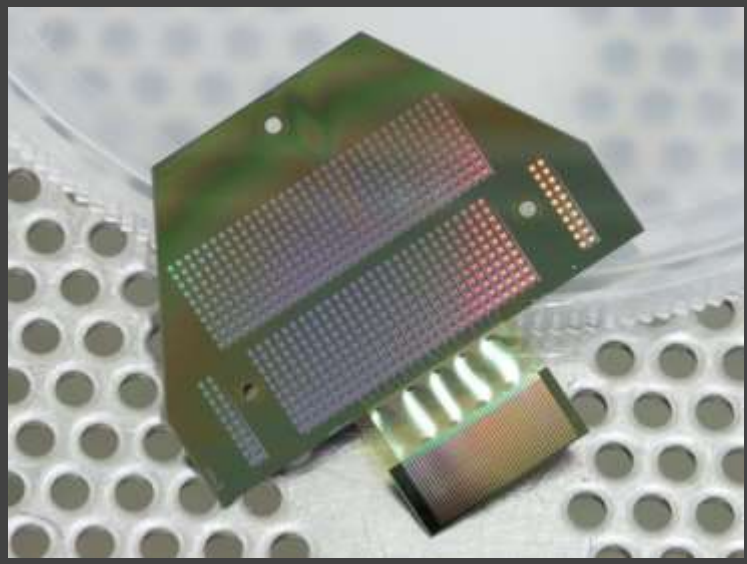


$T_c$ = 5 to 7 K

RRR = 2 to 4



Coils with 2 µm lines



# Results – Electroplated Au bumping

*T = 300 C, 100 N force*

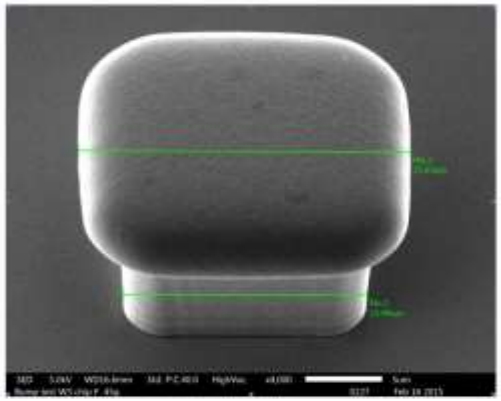


*Fig. 10. Typical Au-bump shape (45 degree view) from 15x15 µm photoresist stencil.*

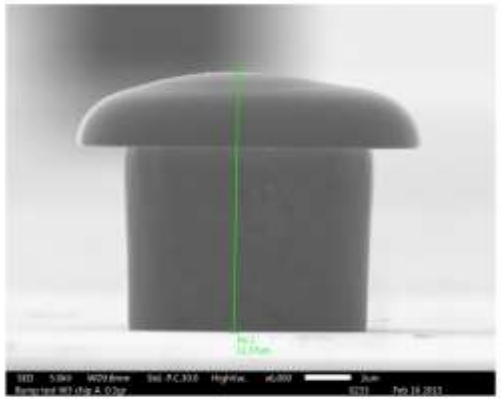
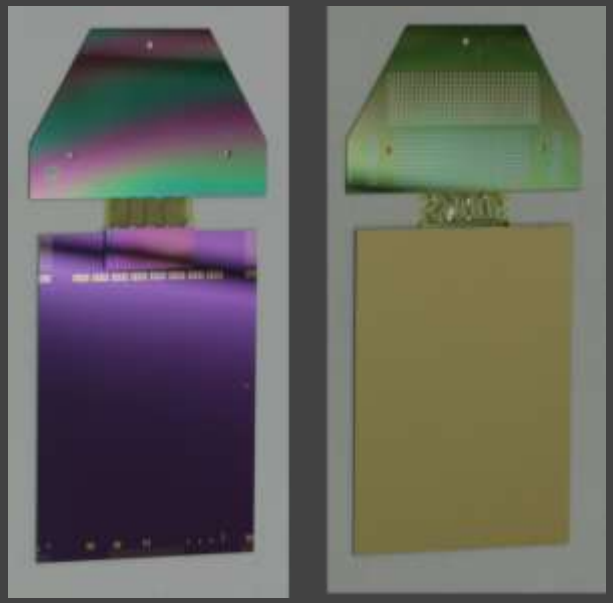
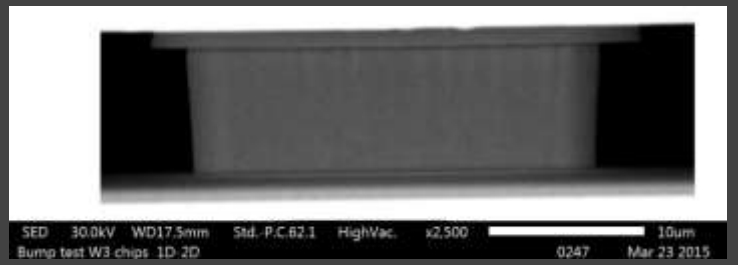


*Fig. 11 Typical Au-bump shape (90 degrees side view) from 10x10 µm resist stencil.*

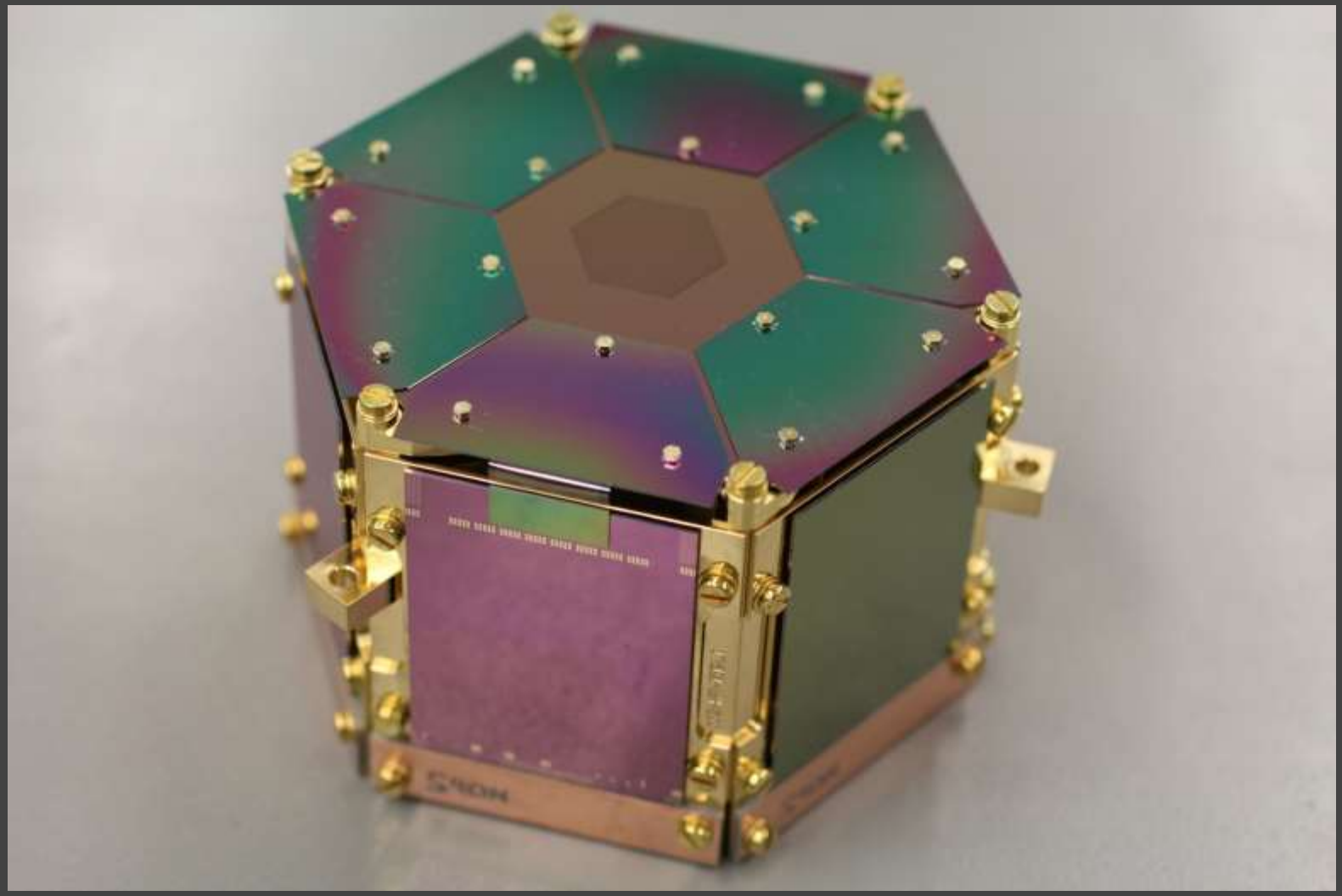





*SEM picture of a bump at the edge, compressed between the two chips.*

Cryogenic bump resistance: $< 1 \times 10^{-5}\ \Omega$

# Mechanical prototype



## Future work :

- Measurement of accurate R-T curves for different superconducting layers in the stack and lines with different width.
- Correlation of R-T measurements to observable properties at room temperature.
- Testing the coupling factor between coils on (dummy) flex chips and (dummy) detector chips. Testing sensitivity to misalignment.
- Testing the performance of TES sensors with FDM readout, coupled with flex connectors.
- Optimization towards application in Athena development and final flight models.