

1st proof of principle tests tiling/positioning

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Tiling

Motivation

- 1m diameter dielectric is not currently available → Tiling

Aim

- Cut dielectric into smaller tiles then fix together again



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First attempts - LaAlO₃

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 - Laser cutting resulted in splintering (our laser)
 - Scoring/breaking also not successful



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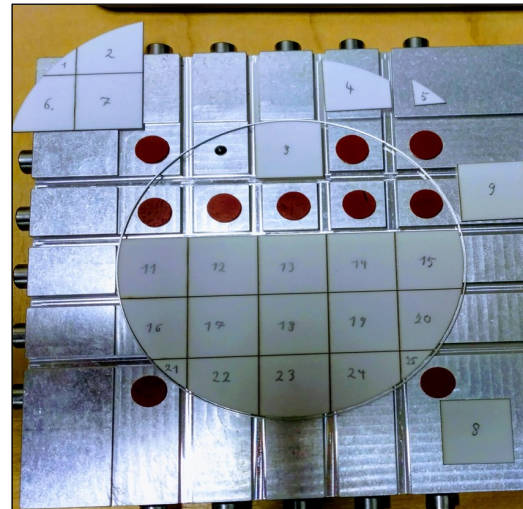
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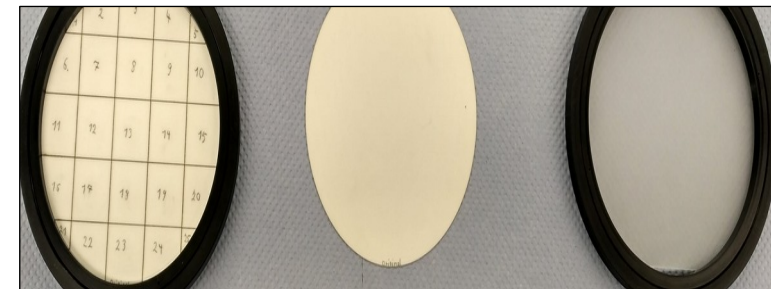
- Ceramic – test on 0.6mm thick disc
 - Laser scoring and breaking successful
 - Ø 100mm disc made of 25 pieces glued with GP11

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Tiles kept in place on suction plate
Held together with aluminium support ring



Left: Tiled ceramic in holder
Middle: Original ceramic for comparison
Right: Sapphire in holder

Positioning – A new concept

Current set-up(s)

- Discs on rails, moved by precision motors
 - So far works well, however, this idea is not fixed, **we must remain open to other ideas...**

Challenges

- 80 x 1000mm discs
- Magnetic field
- Cryogenic temperatures
- μm placement precision
- ???



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New idea - “Cable car”

- Discs supported and moved on lengths of fibre e.g.
 - Each disc attached to 3 lengths of fibre
 - Fibres under tension to support weight and movement
 - Precision motors move the fibres and thus, the discs

Advantages

- Fibre can be suitable for magnetic and cryogenic environment
- Fibres can be thin and introduce relatively little mass into the setup
- Flexibility of motor placement

Disadvantages

- 3 fibres per disc = 240 fibres
- Each disc positioned via 3 separate motors – positioning/reproducibility difficulties?
- Temperature sensitive



Positioning – A new concept

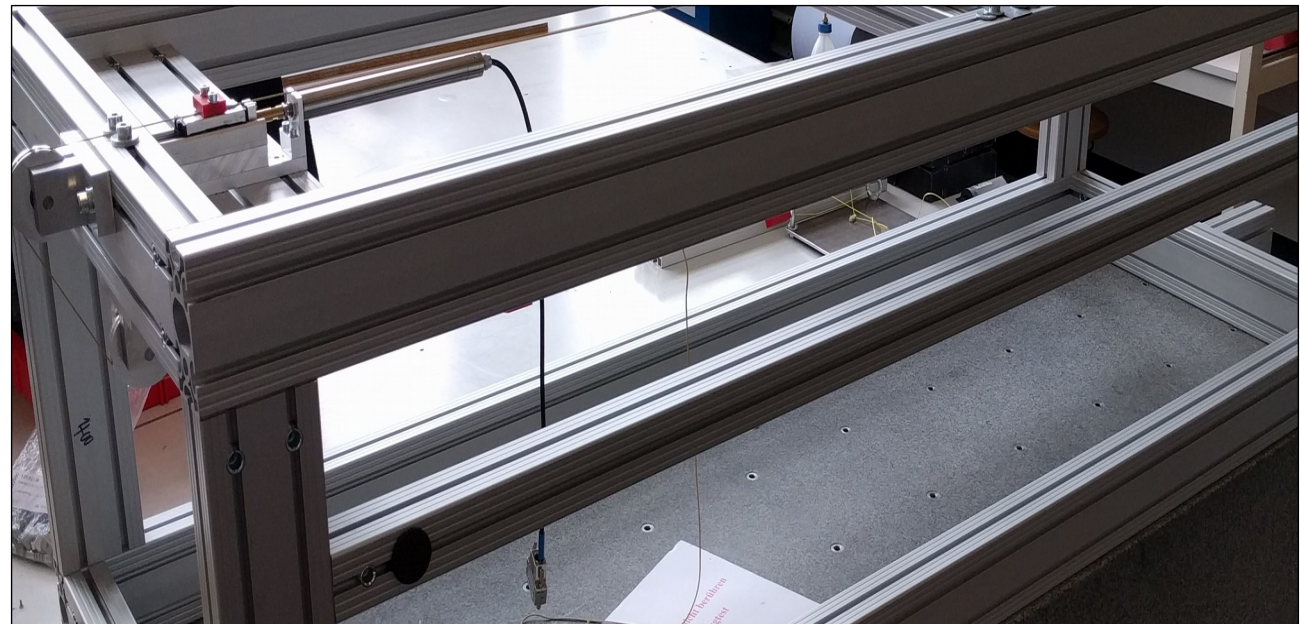
First Tests

Stretching + Tensile Tests

- Carbon fibre roving
 - Tears under strain (30kg)
- Aramid fibre
 - Does not tear (up to 80kg)
 - Test with 2m pre-stretched fibre (60kg) → ~0.3mm temperature dependant deviation with 40kg (over several days)

With motor movement

- μm movement/reproducibility seems possible at this time



Going forward...

Tiling

- Plan for Hamburg to take over
 - Munich can still provide support/expertise

Positioning

- Munich will continue tests on cable car concept
- Motors
- Other concepts



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Nothing is set in stone...

New ideas are welcome...

More ideas means better adaptability going forward

