Free surfaces of liquids in Interferometric Methods

Application to Split Corner Cubes (SCC)

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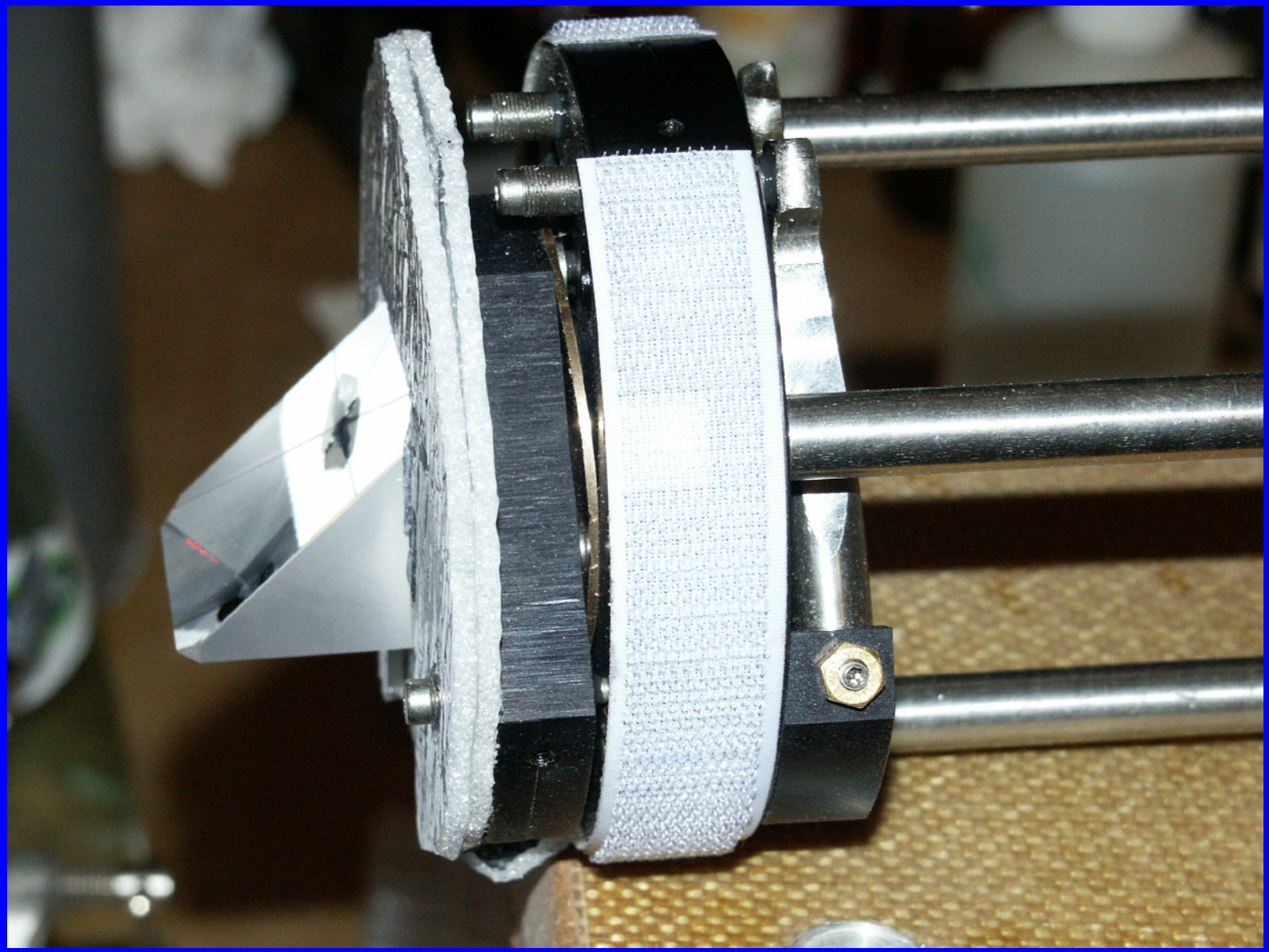
Split Corner Cube Build-up (1)

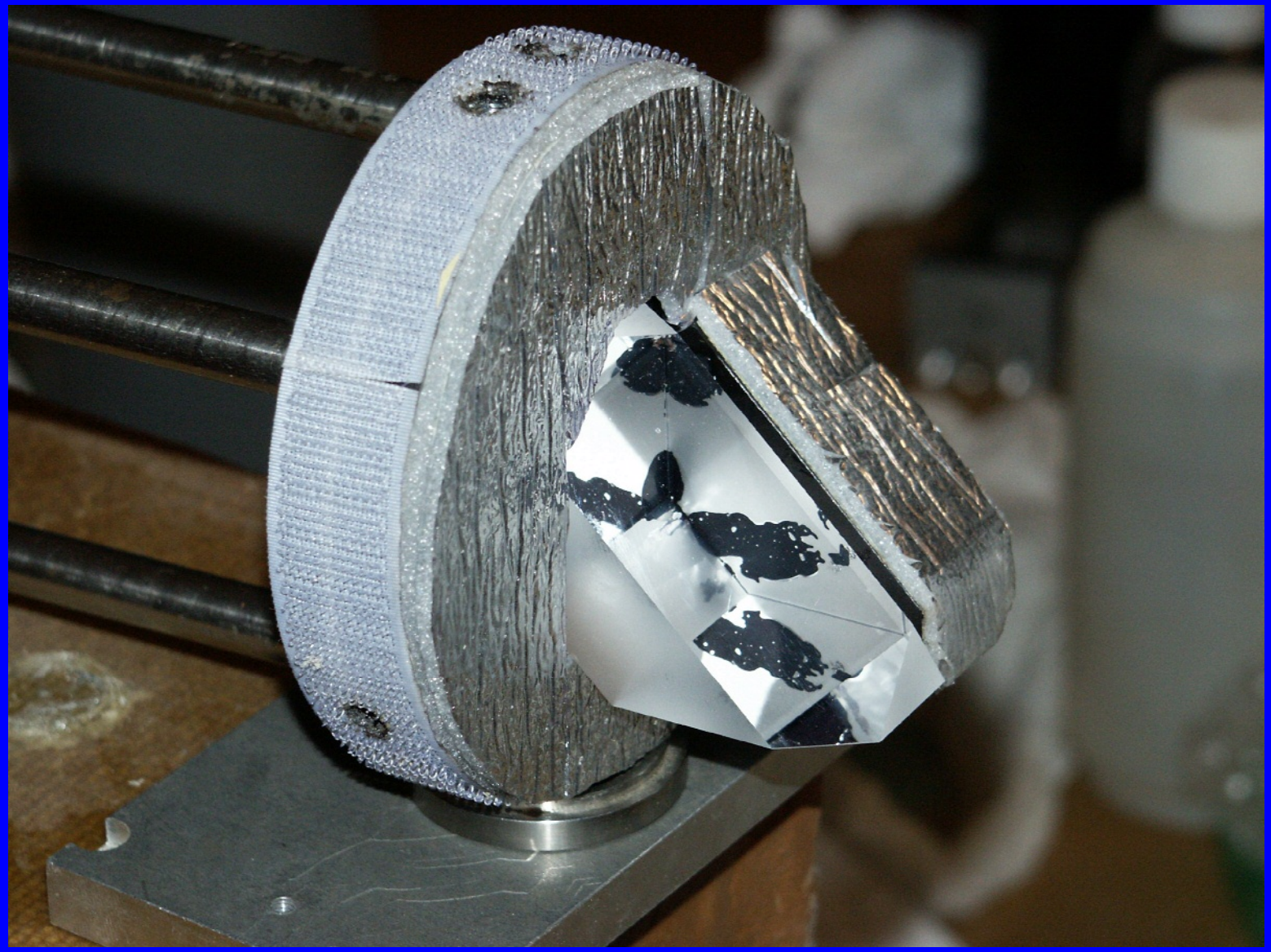
- 3 Rods in Invar for Thermal Stability
- 1 Roof Prism and 1 Right Angle Prism
- Orientation Adjustment of Right Angle Prism by:
    - 2 screws for coarse adjustment (0.50 mm/turn)
    - 2 screws acting through 1÷50 ratio levers for fine adjustment
    - Overall precision:
        - less than 1 arc-minute for 10° on coarse screws
        - around 1 arc-second for 10° on fine screws
    - Overall stability (mid & long term)
        - few arc-seconds over months

Split Corner-Cube Build-up (2)



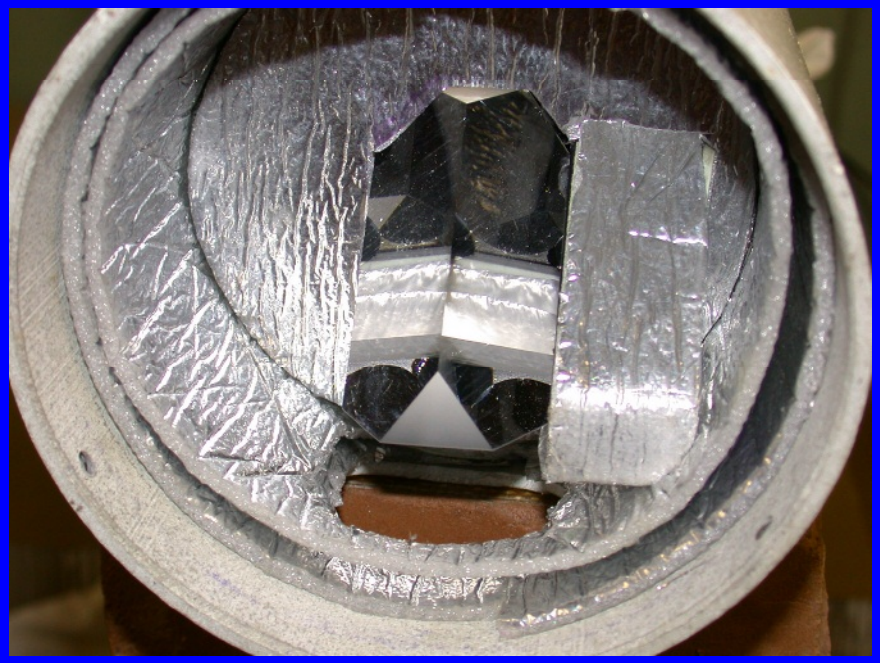
Details of the Right Angle Prism Mount with the Adjustment Screws and Levers

Split Corner-Cube Build-up (3)



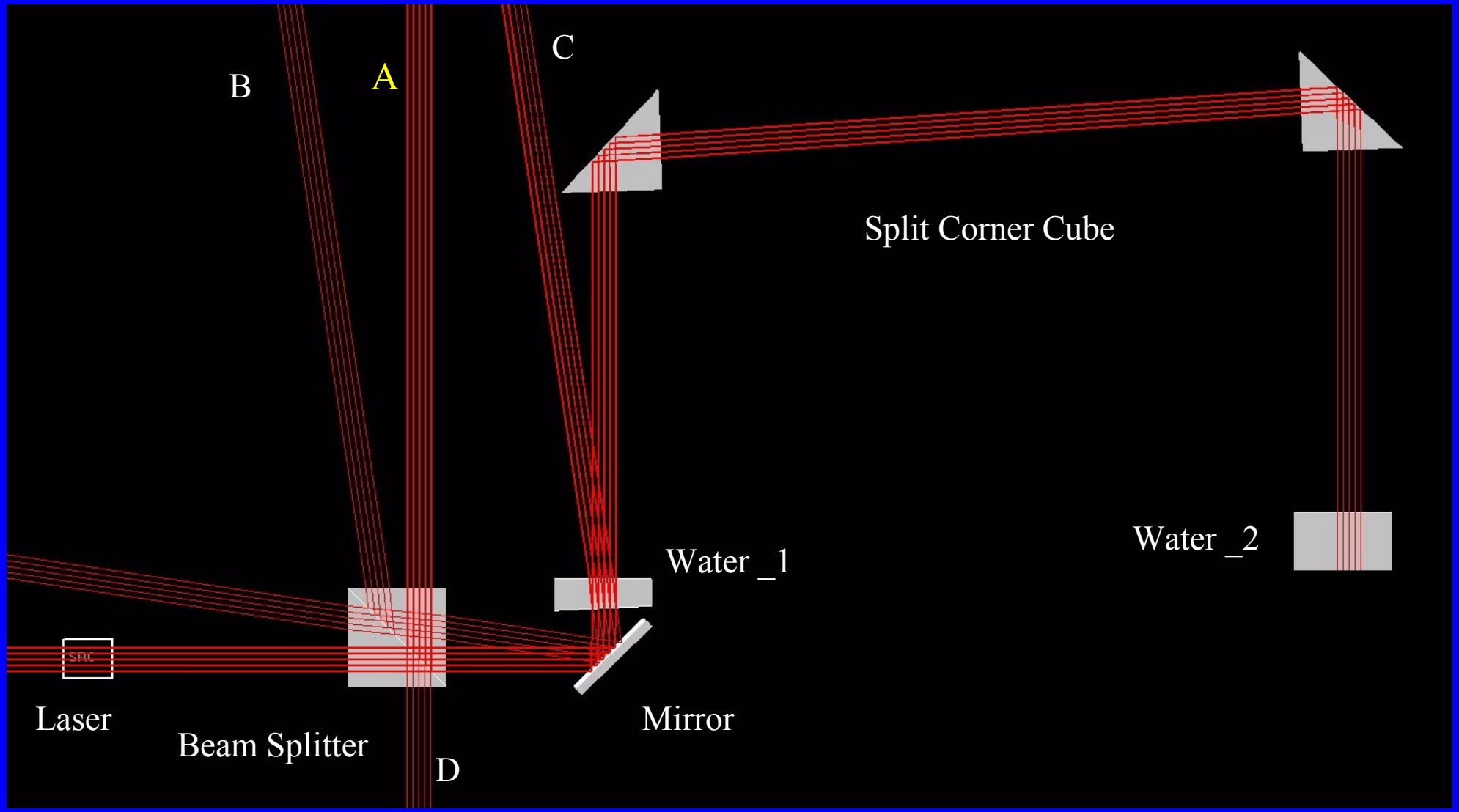
Details of the Roof Prism Mount (fixed)

Split Corner-Cube Build-up (4)



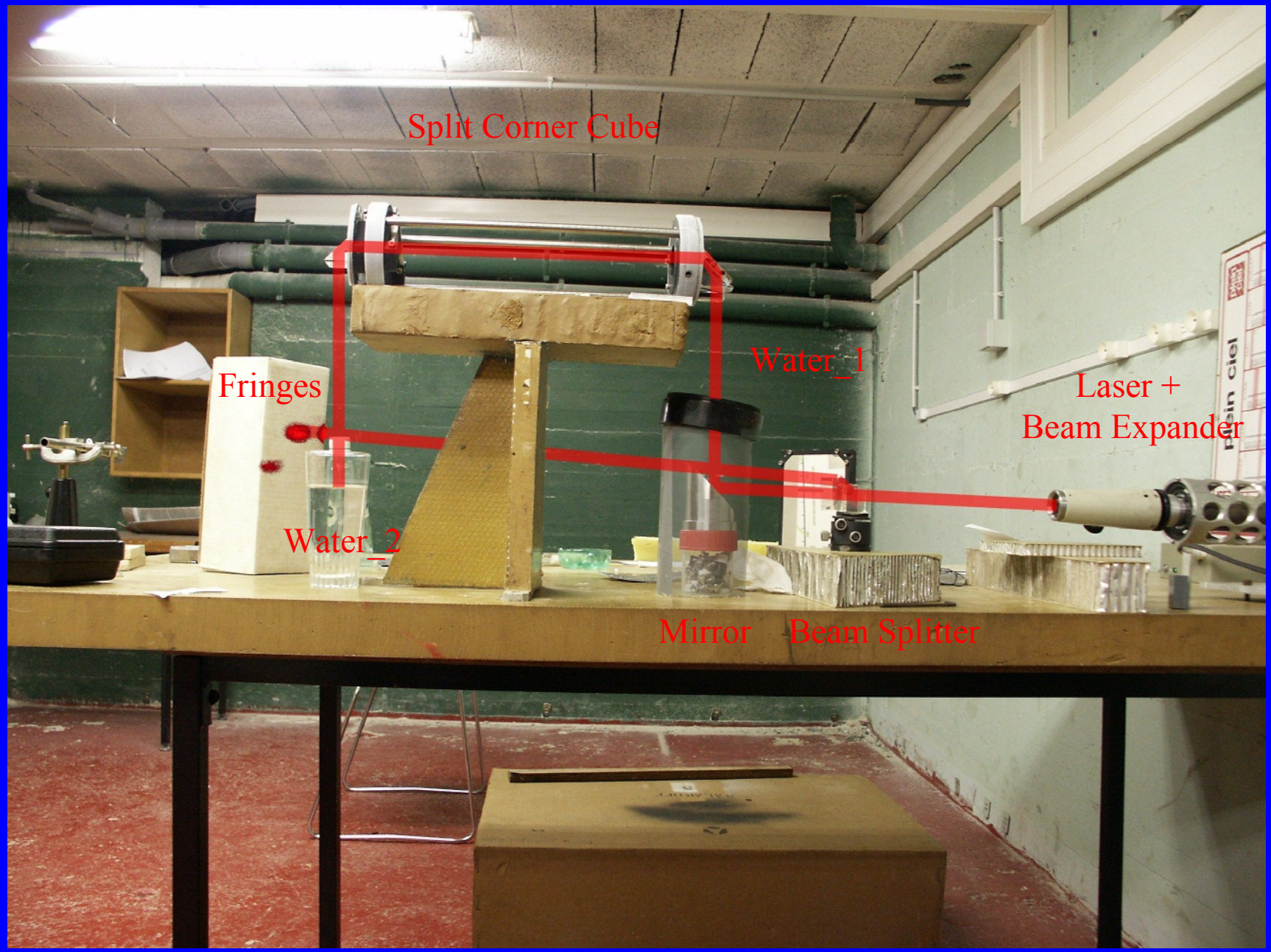
Details of the Thermal Isolation

Experimental Setup for Alignment of SCC (1)

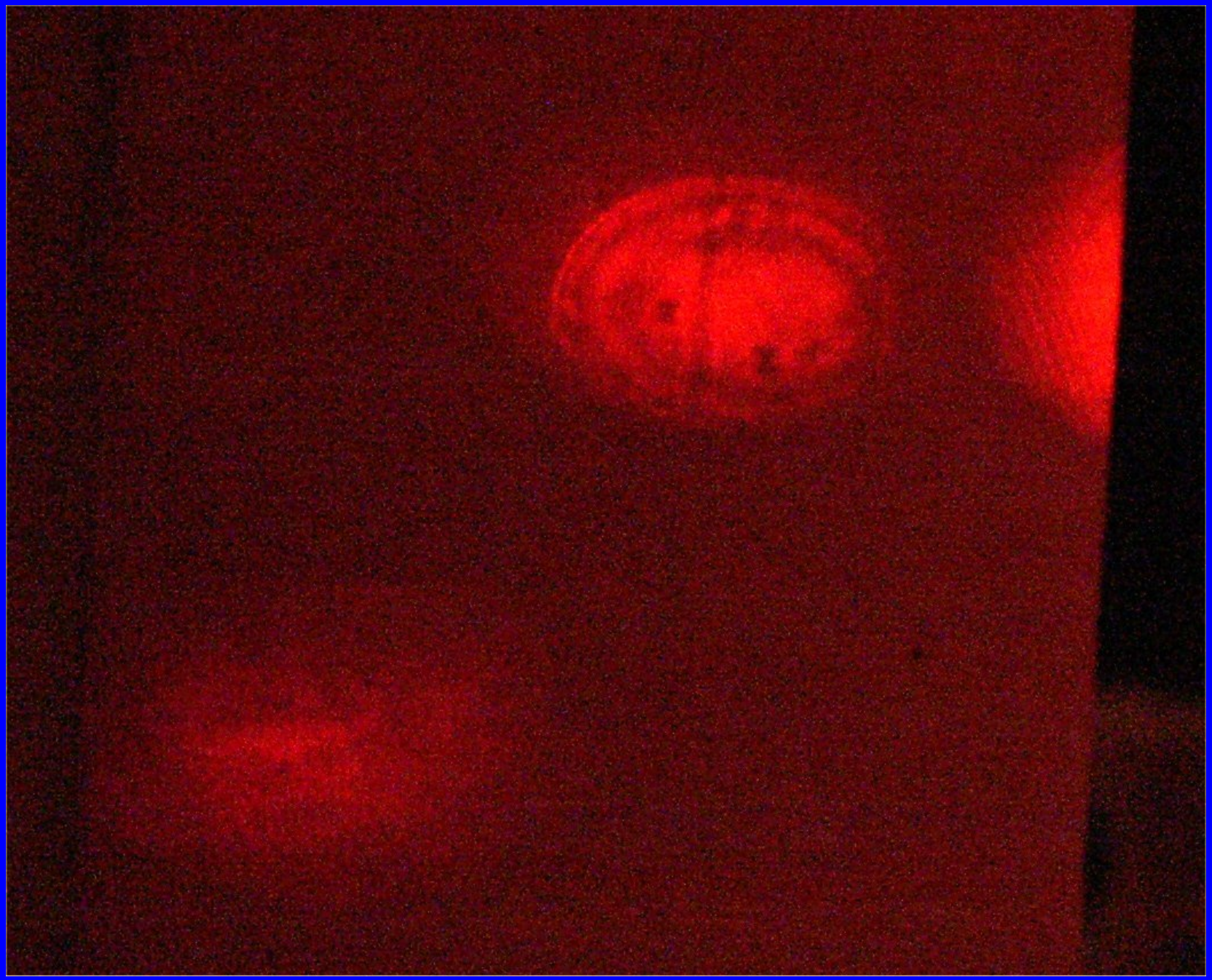


- A: Fringes from free surfaces of water
- B: Reflection from bottom window of Water _1
- C: Reflection of Water_2 on bottom window of Water_1
- D: Spare beam split from laser

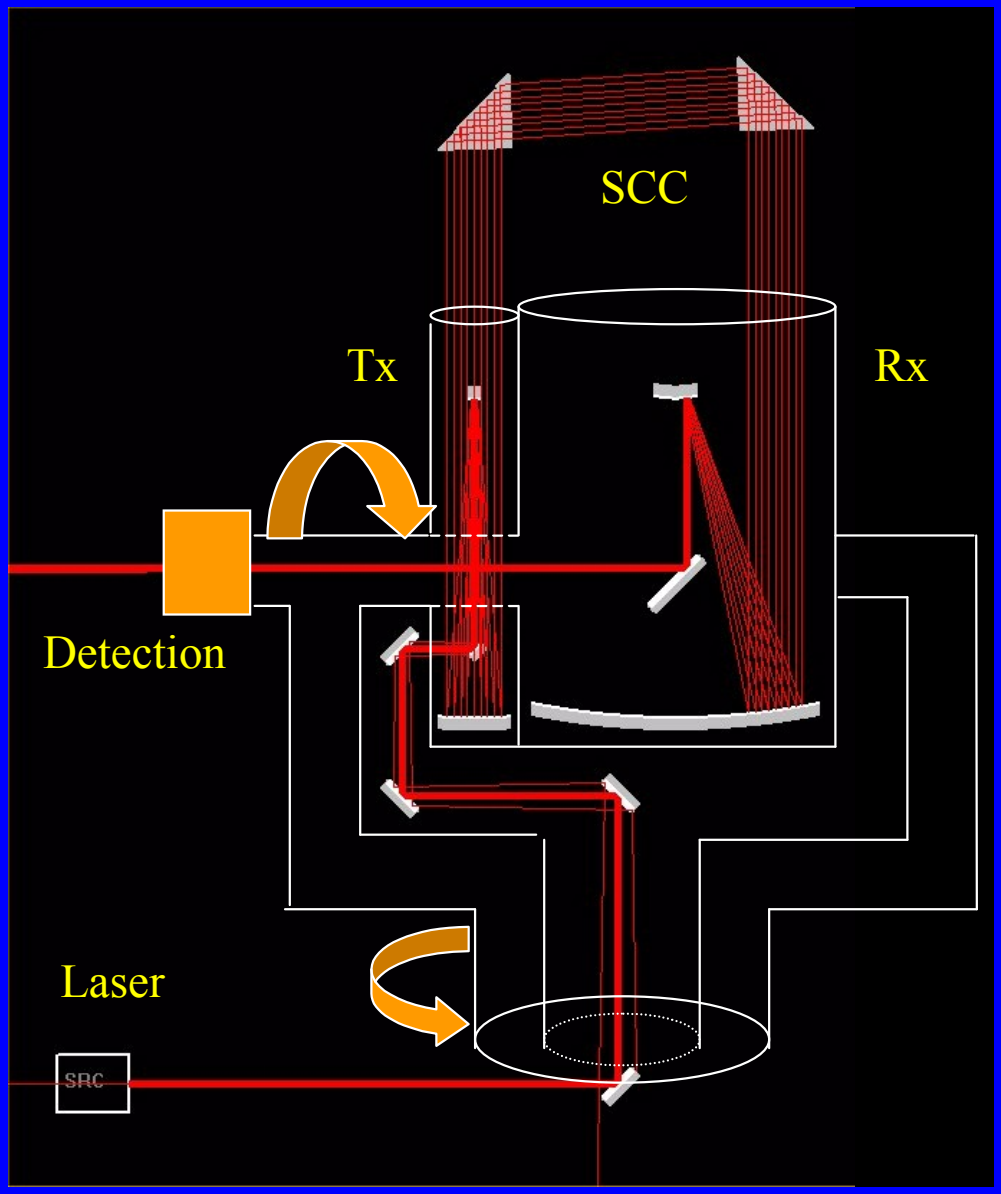
Experimental Setup for SCC alignment (2)

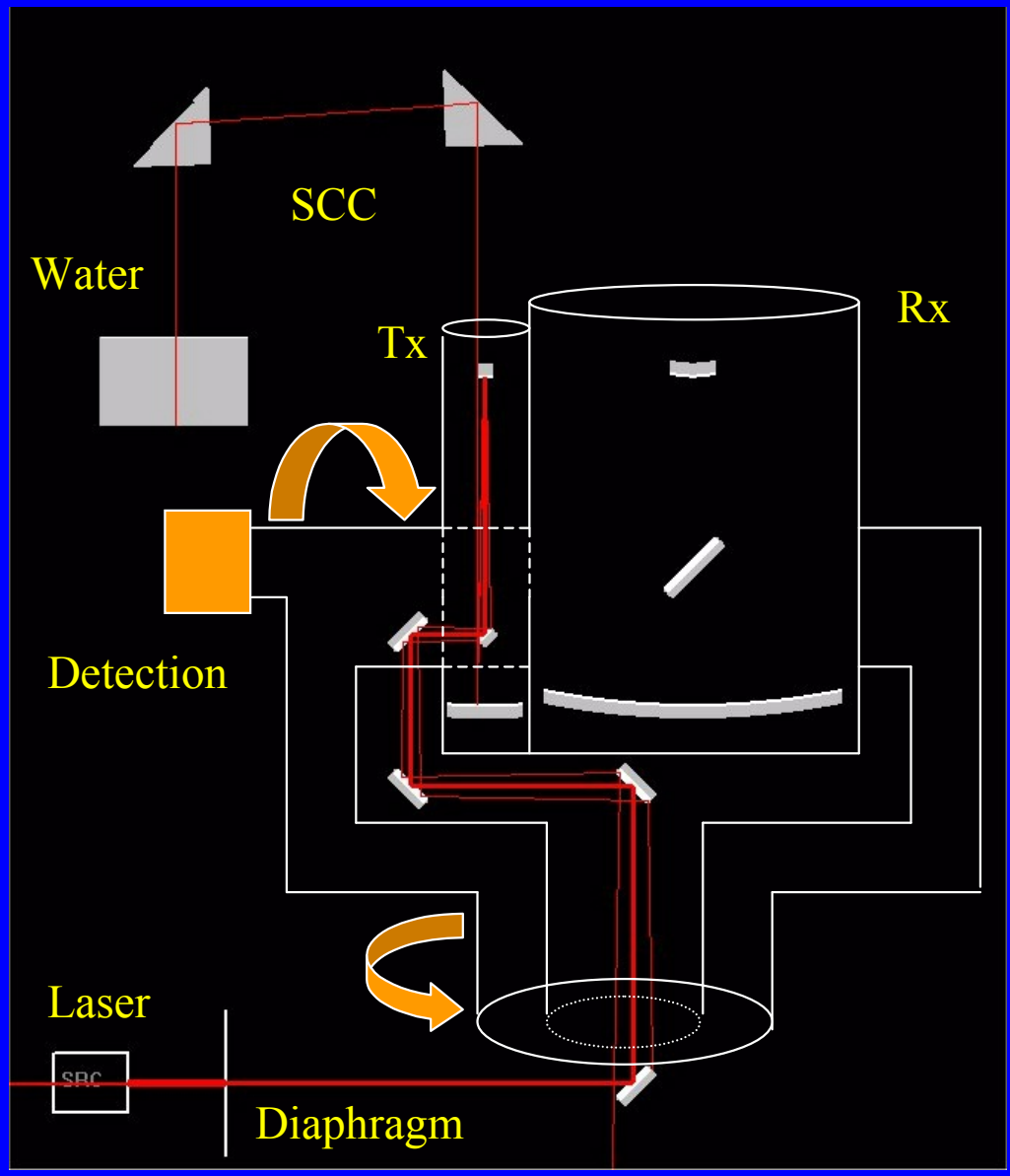


Detail of Fringes



Applications





- Emission/Reception Parallelism

- Control of Mount & Zero of Alt Encoder

Conclusions

- Interferometric method allows SCC adjustment down to 1 arc-second accuracy (equivalent to 1 mm at 200 m)
- Use of a free liquid surface as both a flat and an horizontal reference avoids the needs for an huge optical quality flat
- Careful construction (Invar & thermal insulation) gives a mid/long-term stability of the same order
- Such a tool is very valuable for alignment chores of SLR stations