



# ESS – HIGHNESS KICKOFF

WP5: Engineering

2020.10.21 | Y. BEßLER & C. HAPPE & E. ROSENTHAL & M. STROTHMANN

# ESS HIGHNESS – WP5 ENGINEERING

## Content

1. Project team and schedule
2. General overview
3. Technical design solution of current twister generation
4. Design study of twister with two moderators and reflectors - status 2016
5. Summary & outlook

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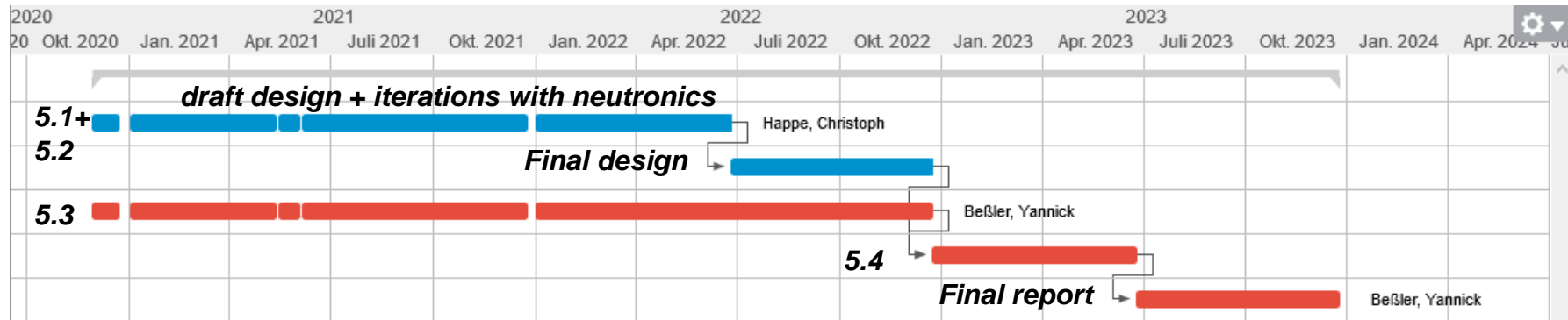
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## Project team and schedule

Project team at Forschungszentrum Jülich:

- Work package leader: Yannick Beßler
- Engineering Design: Christoph Happe
- Experiments: Eberhard Rosenthal
- PhD student: Mathias Strothmann

Project schedule:



5.1 Deuterium moderator engineering design

5.2 Ultra-cold moderator design

5.3 Mechanical & fluid dynamic design

5.4 Neutron Beam extraction prototype

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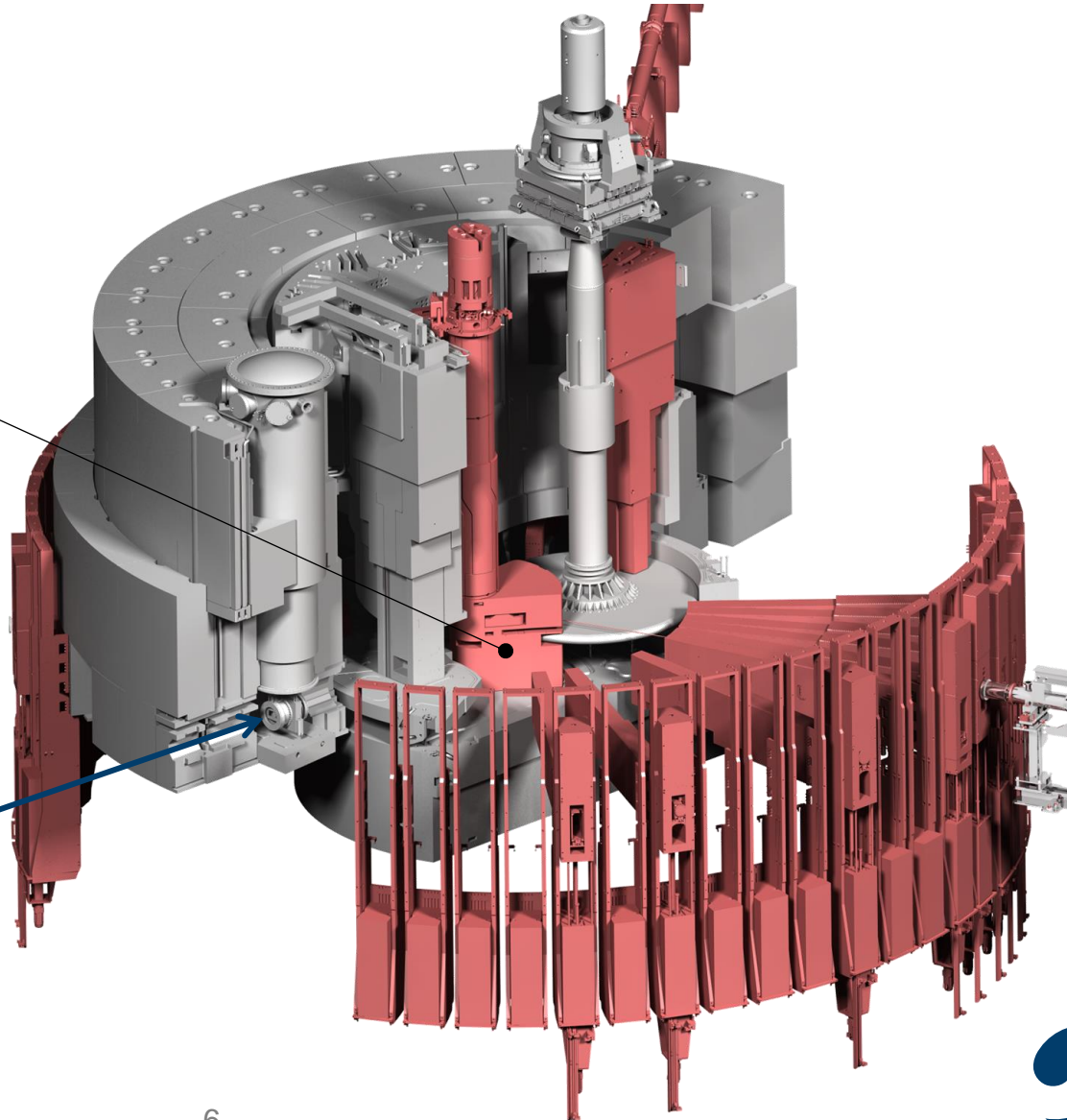
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## General overview

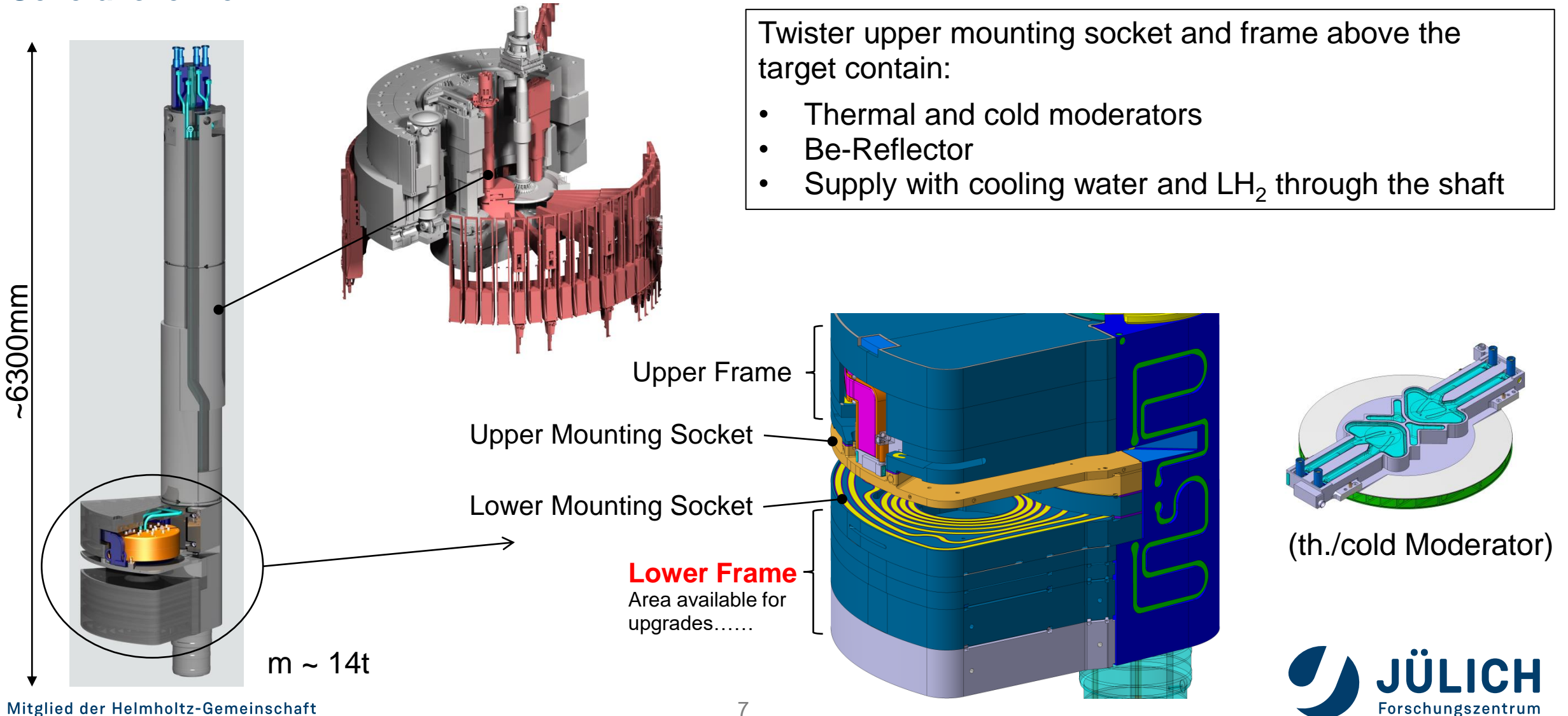
Moderator & Reflector Plug  
„Twister“

Proton-Beam to  
Spallation Target



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## General overview



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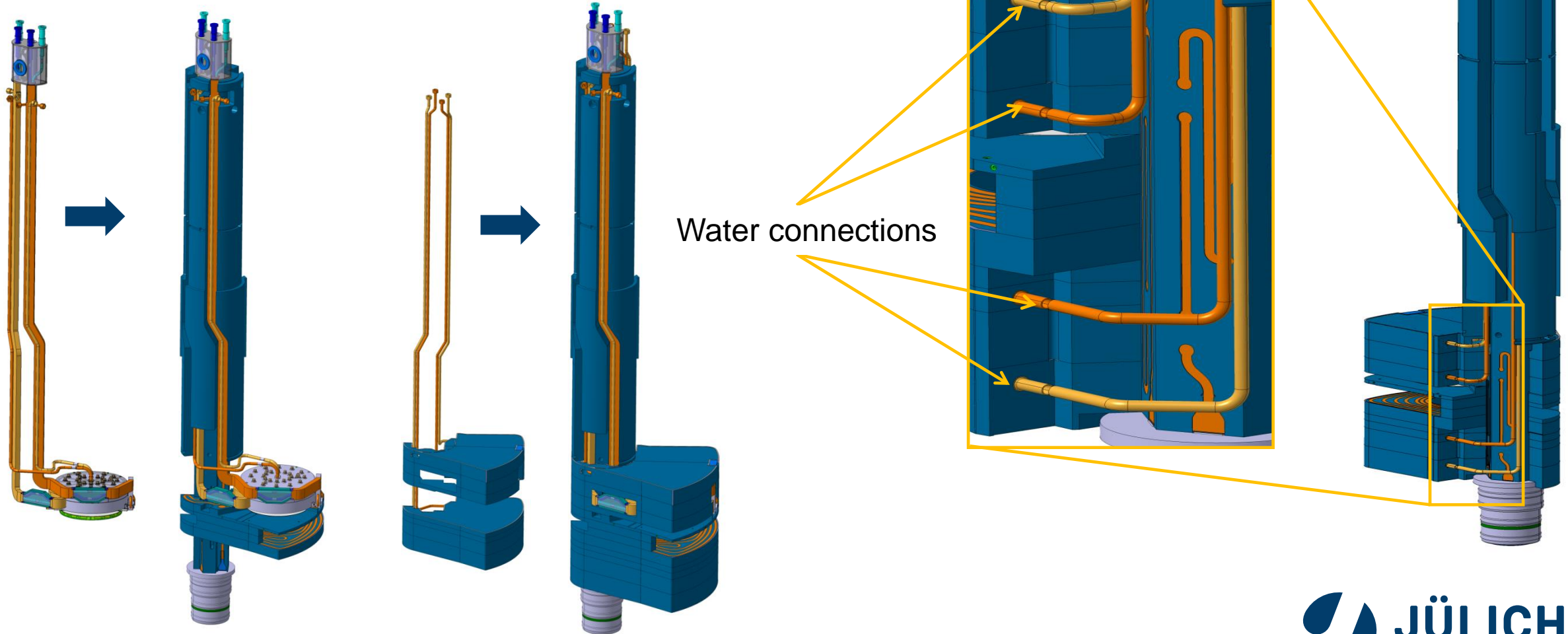
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## Technical design solution of 1<sup>st</sup> generation

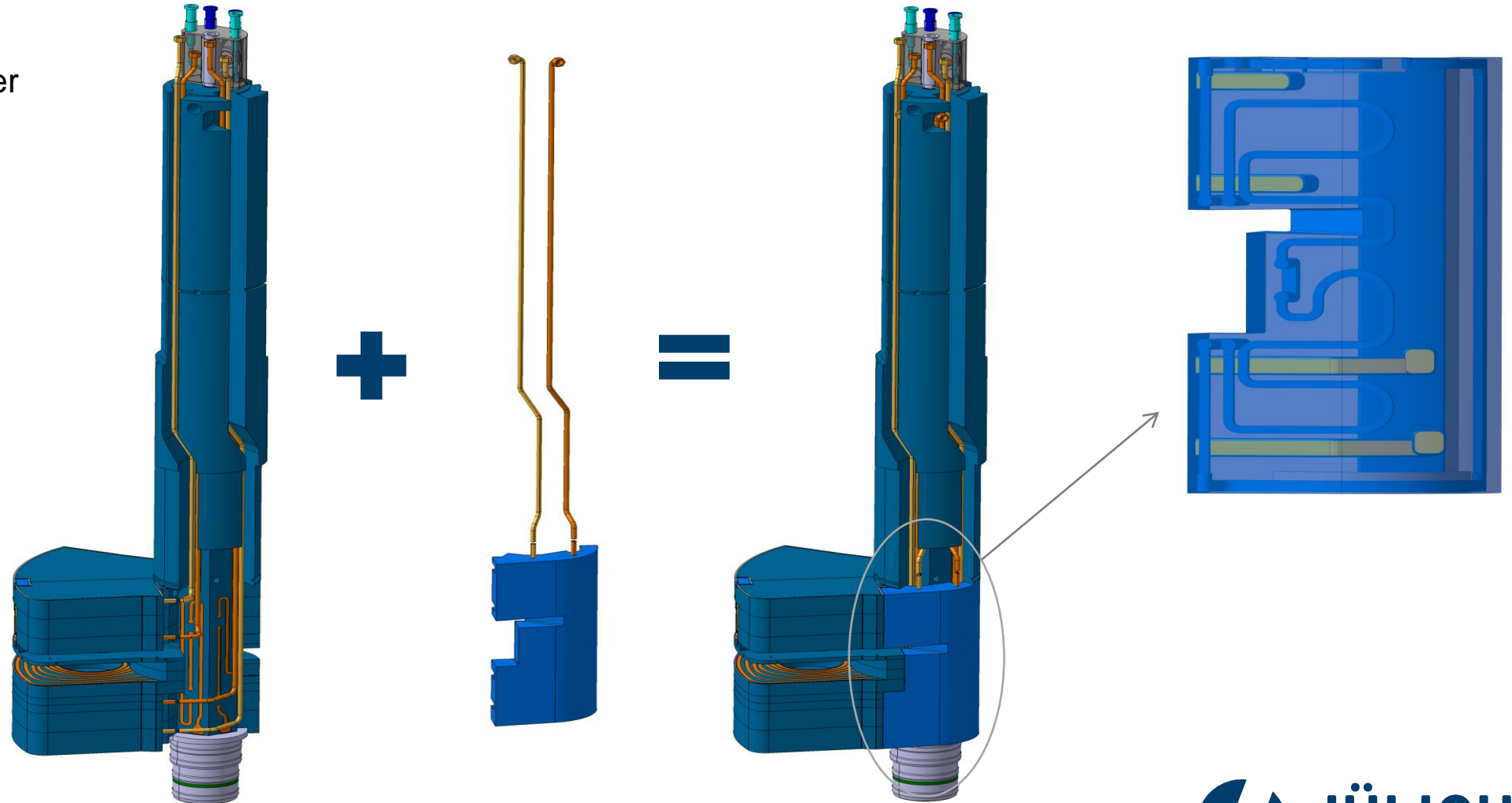
- Multi-stage assembly of the twister shaft



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## Technical design solution of 1<sup>st</sup> generation

- Integration of the water cooling inserts



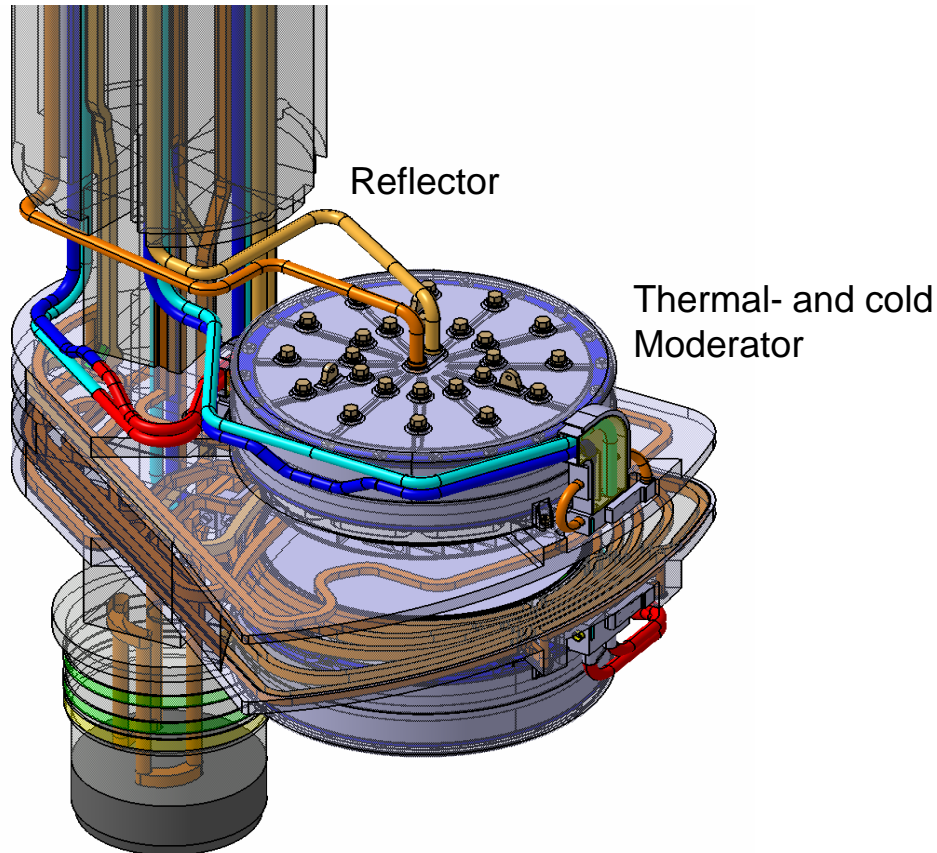
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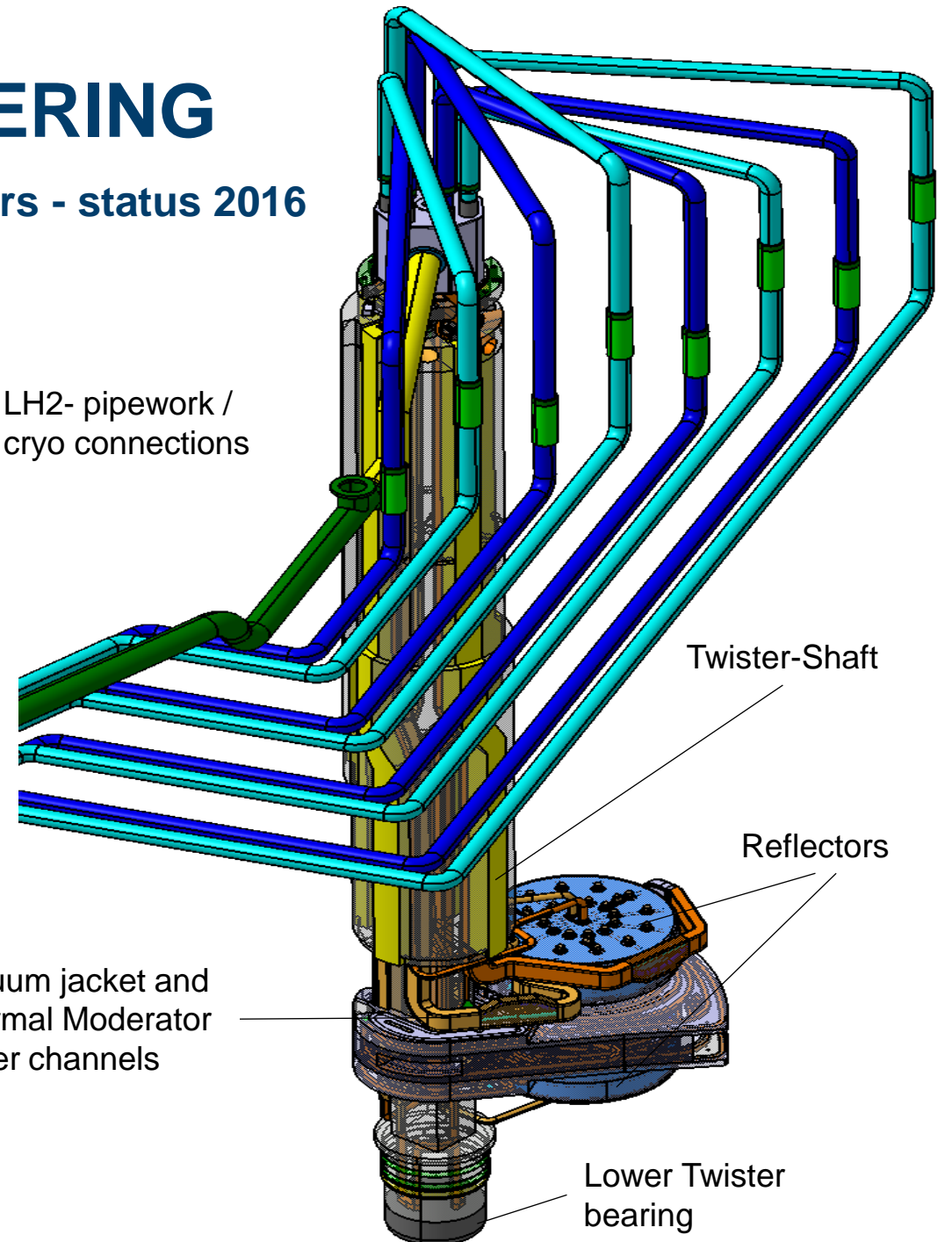
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Design study of twister with two moderators and reflectors - status 2016



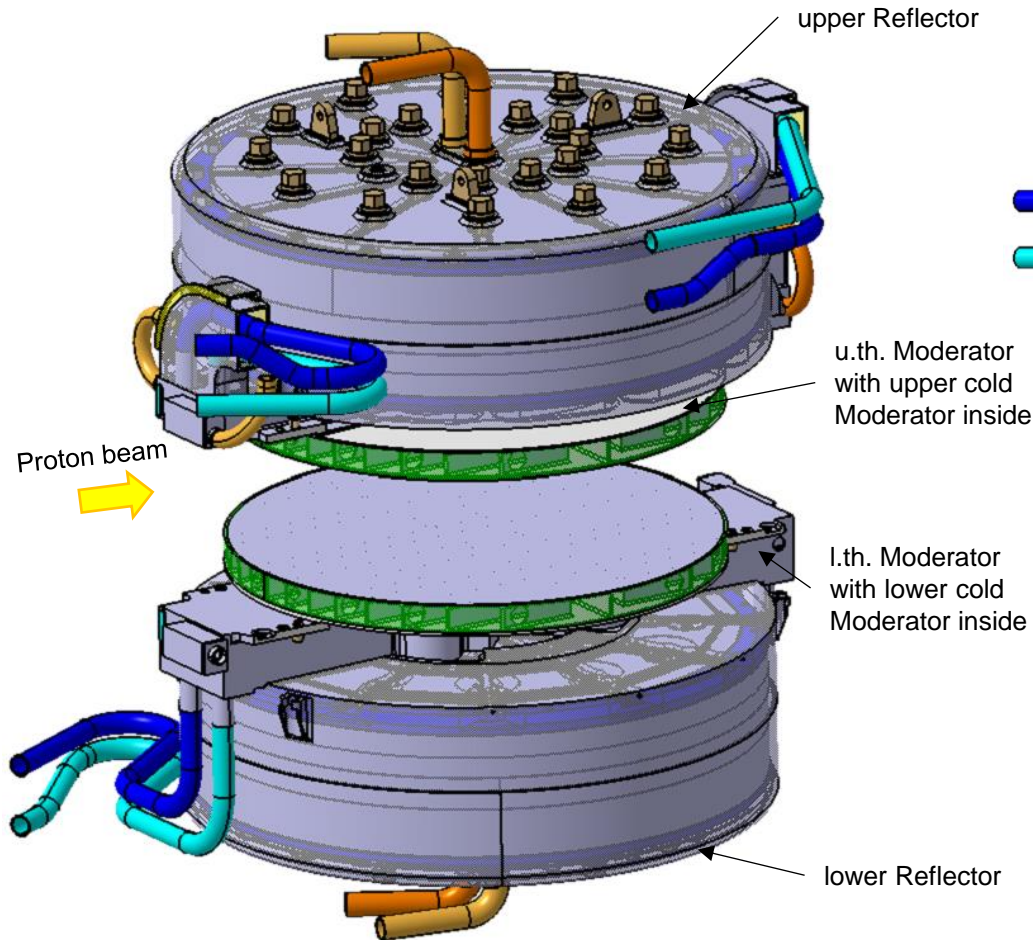
LH2- pipework /  
cryo connections



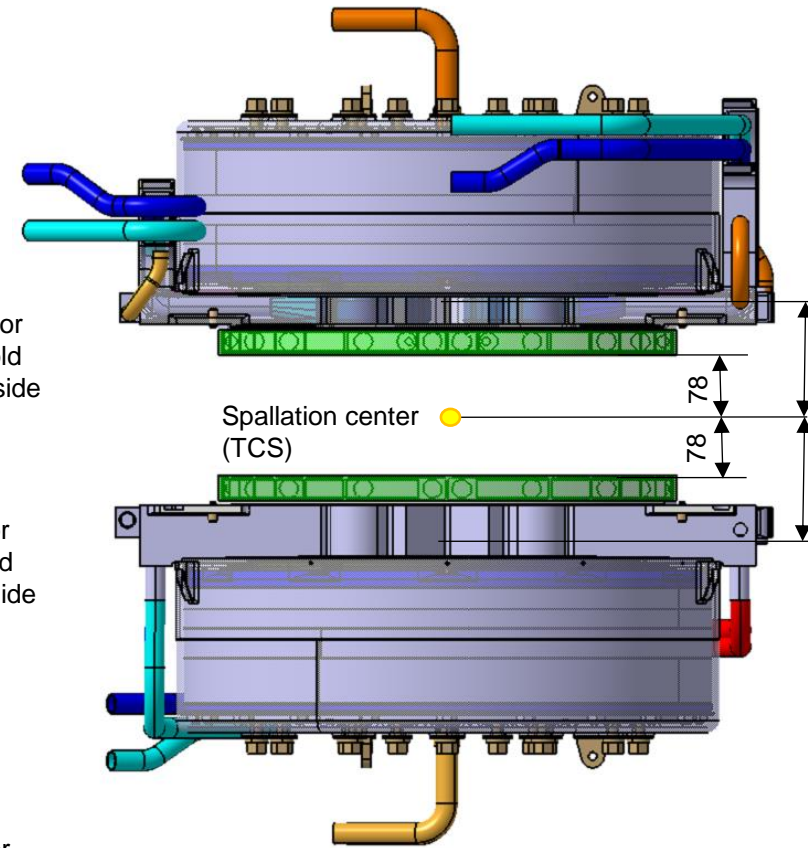
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## Design study of twister with two moderators and reflectors - status 2016

### Upper and lower Reflector / Moderator Systems



Isometric view

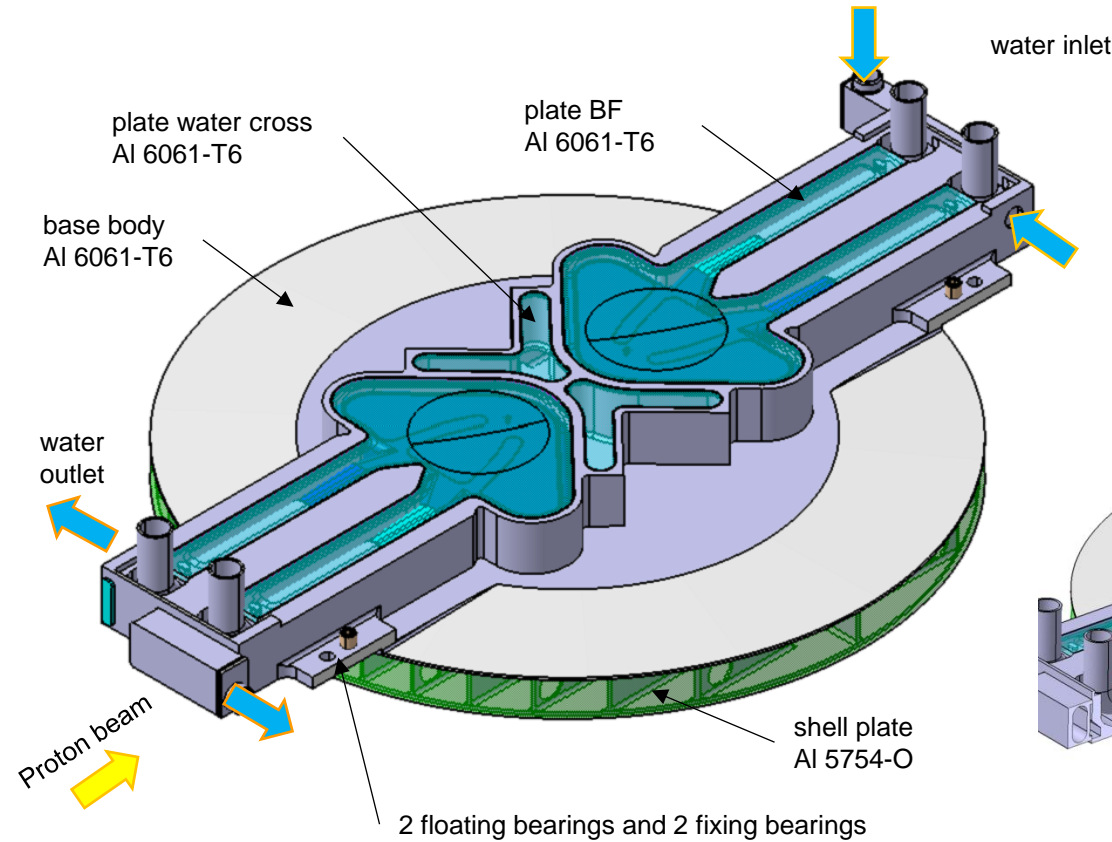


Side view

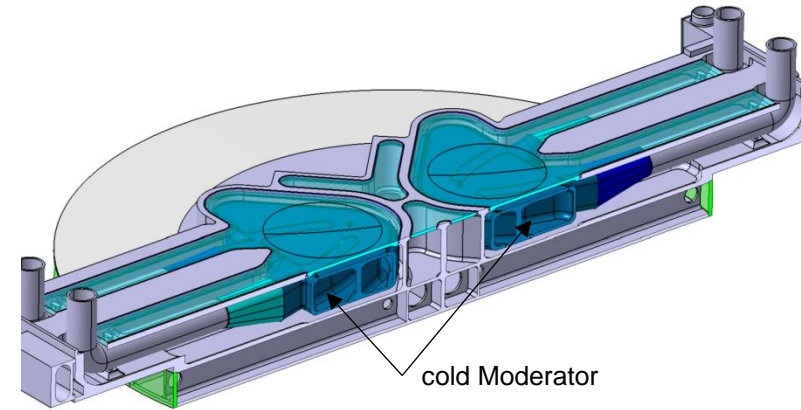
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## Design study of twister with two moderators and reflectors - status 2016

### Overview upper thermal Moderator



Isometric view of the upper thermal Moderator



Isometric Section view of the upper thermal Moderator

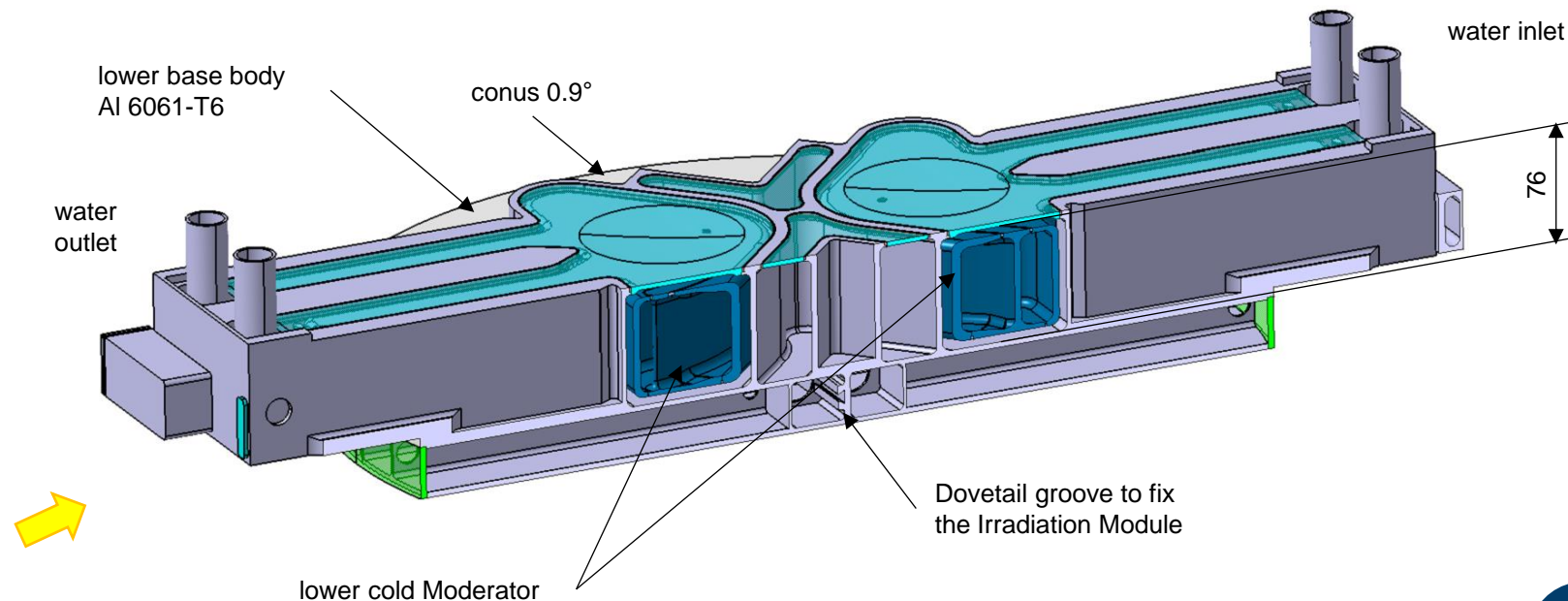
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### Lower thermal Moderator

Difference between the upper and lower thermal Moderator are:

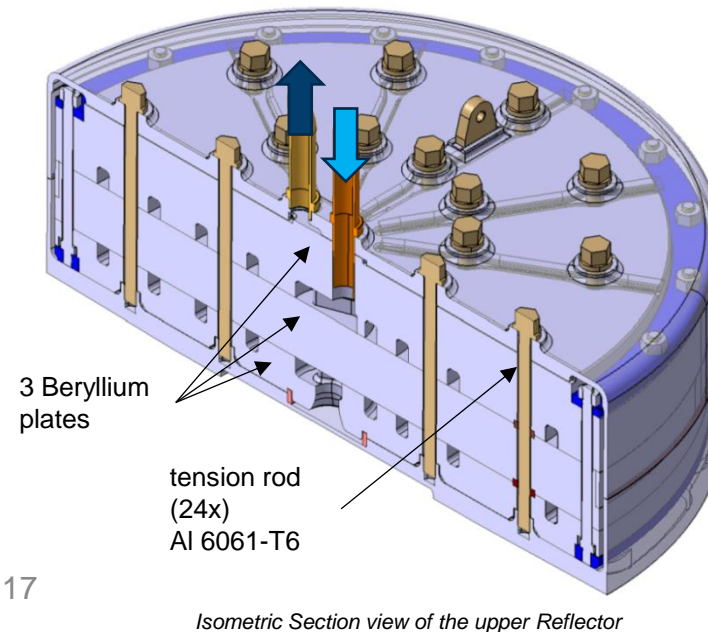
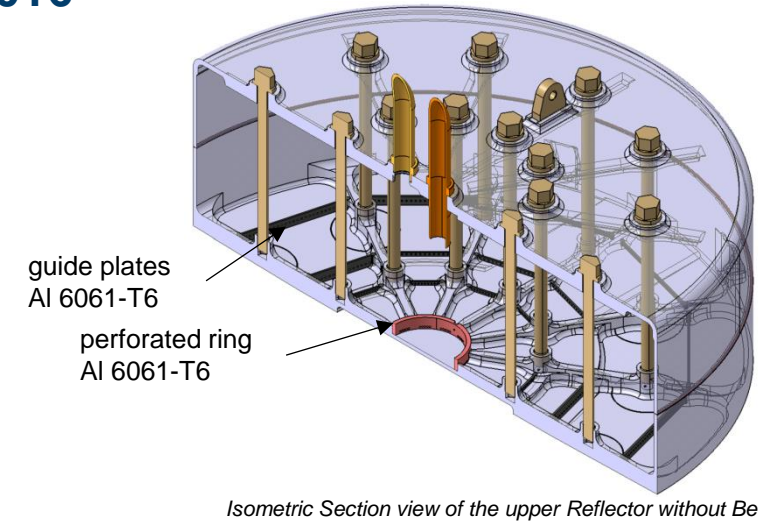
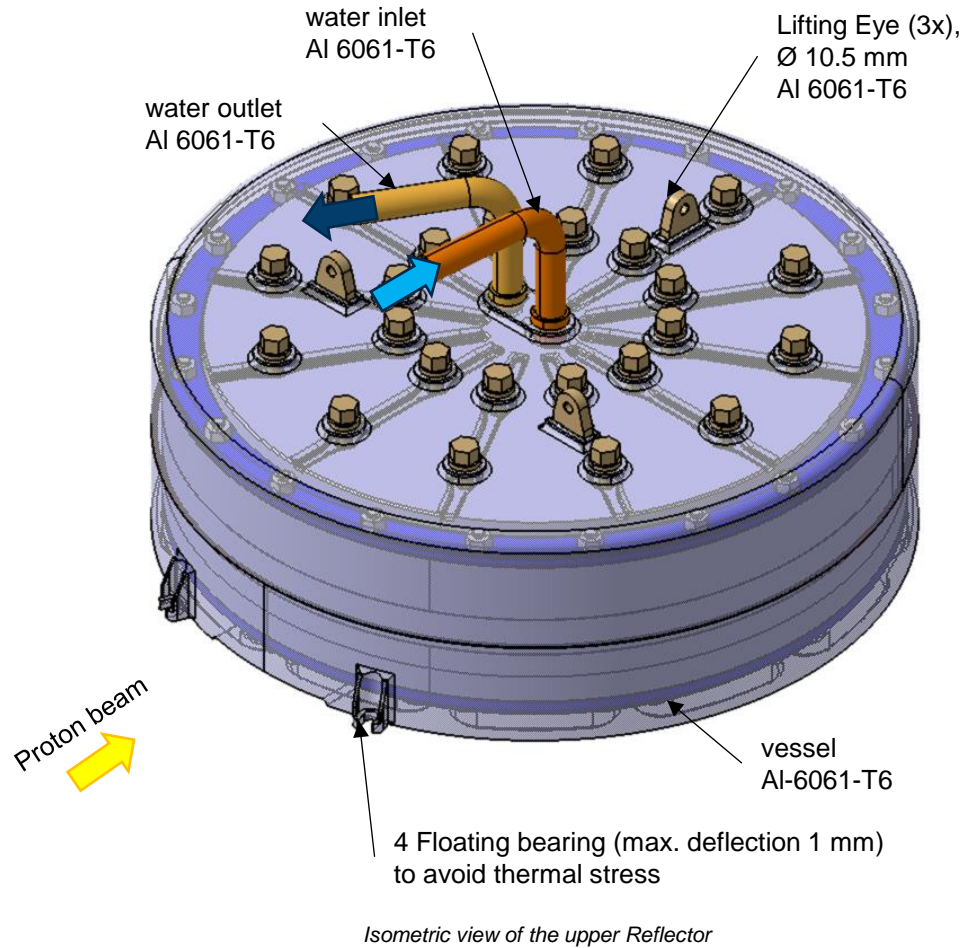
- the conus of the upper th. Moderator is  $2^\circ$  and of the lower th. Moderator  $0.9^\circ$ .
- the BF height of the upper th. Moderator is 46 mm and of the lower th. Moderator 76 mm.
- in the lower th. Moderator is a dovetail groove in the water disk to fix the Irradiation Module



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## Design study of twister with two moderators and reflectors - status 2016

### Overview upper Reflector





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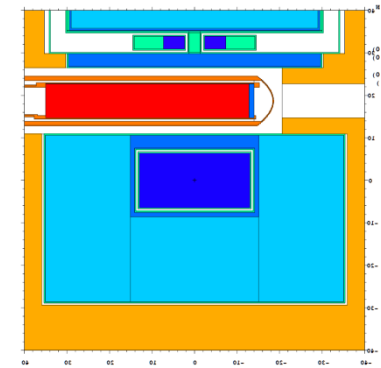
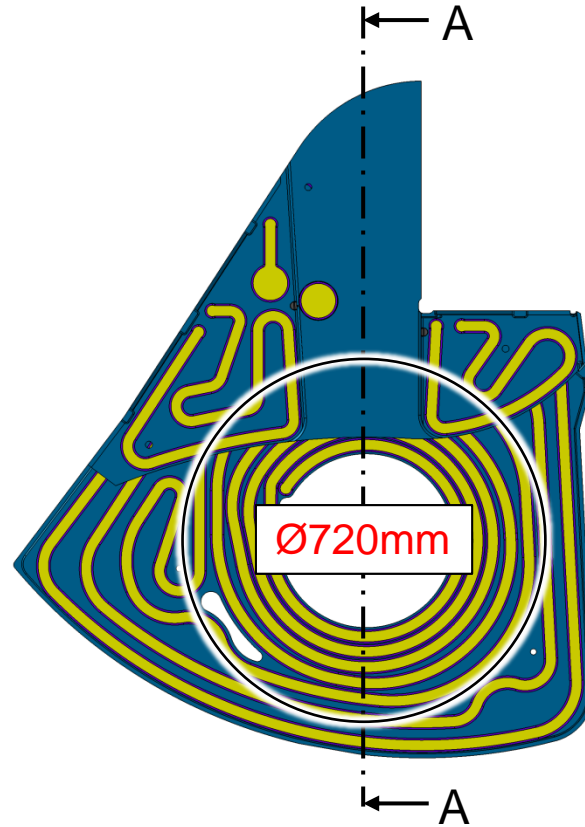
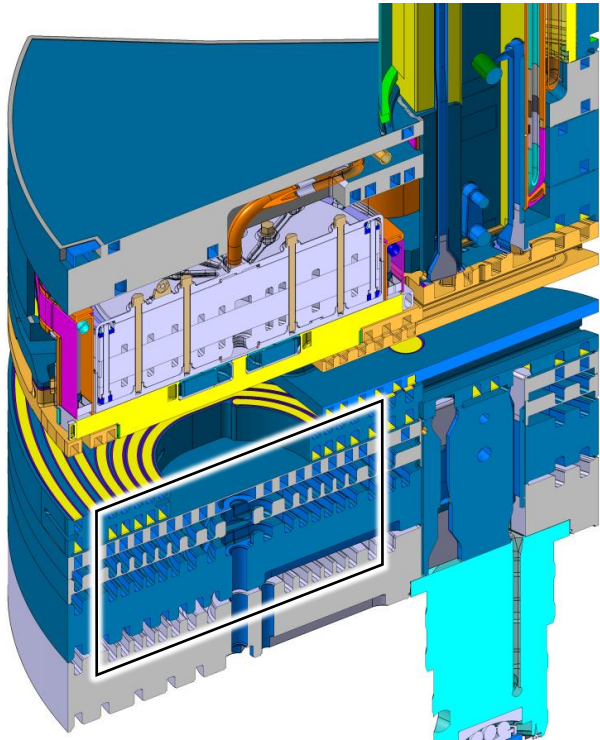
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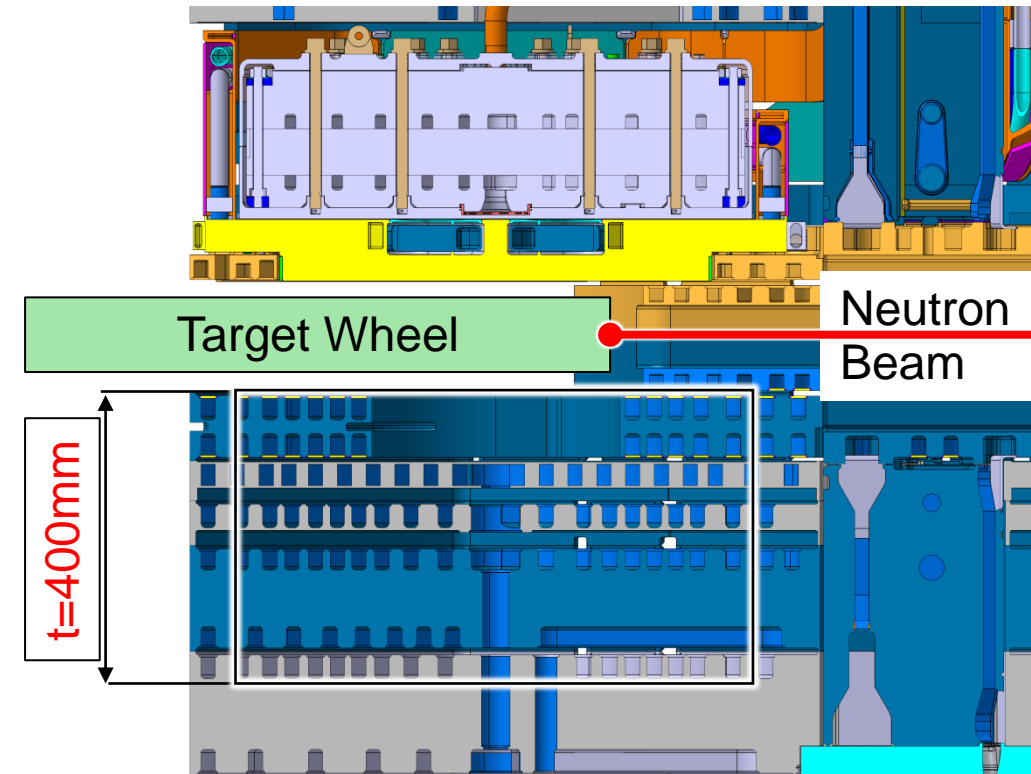
## Summary & outlook

Limited space available in the lower mounting socket below the target:

- The frame layers need to be actively cooled – critical in areas with small wall thickness
- The frame needs to have a certain minimum radial wall thickness
- Supply pipework needs to be guided in aluminum jackets that occupy a not negligible space



A-A



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