

# 40T Pulsed Field Magnet for neutron scattering...

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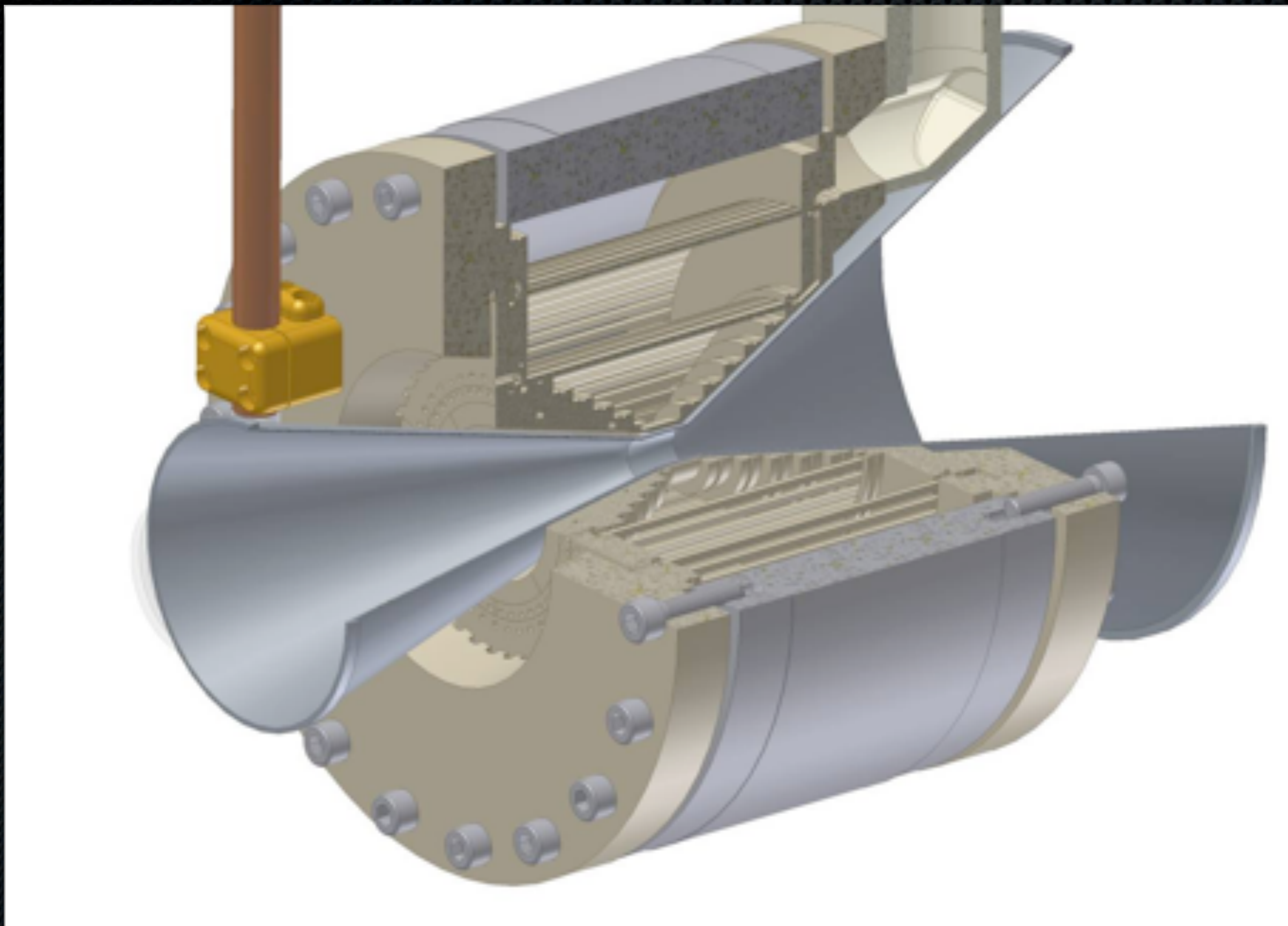
# ANR Project “MAGFINS”

- ✦ Roles of partners
  - ✦ LNCMI Toulouse: 40 T coil, 1.15 MJ power supply
  - ✦ ILL: Cryostat hosting coil and sample
  - ✦ CEA Grenoble: Neutron optics, detector
  - ✦ CNRS Grenoble:  $\text{CdCr}_2\text{O}_4$ ,  $\text{TbB}_4$  for validating...
- ✦ Ranked 28/143: Accepted in Dec. 2010, 600 k€

# 40T Pulsed Field Magnet

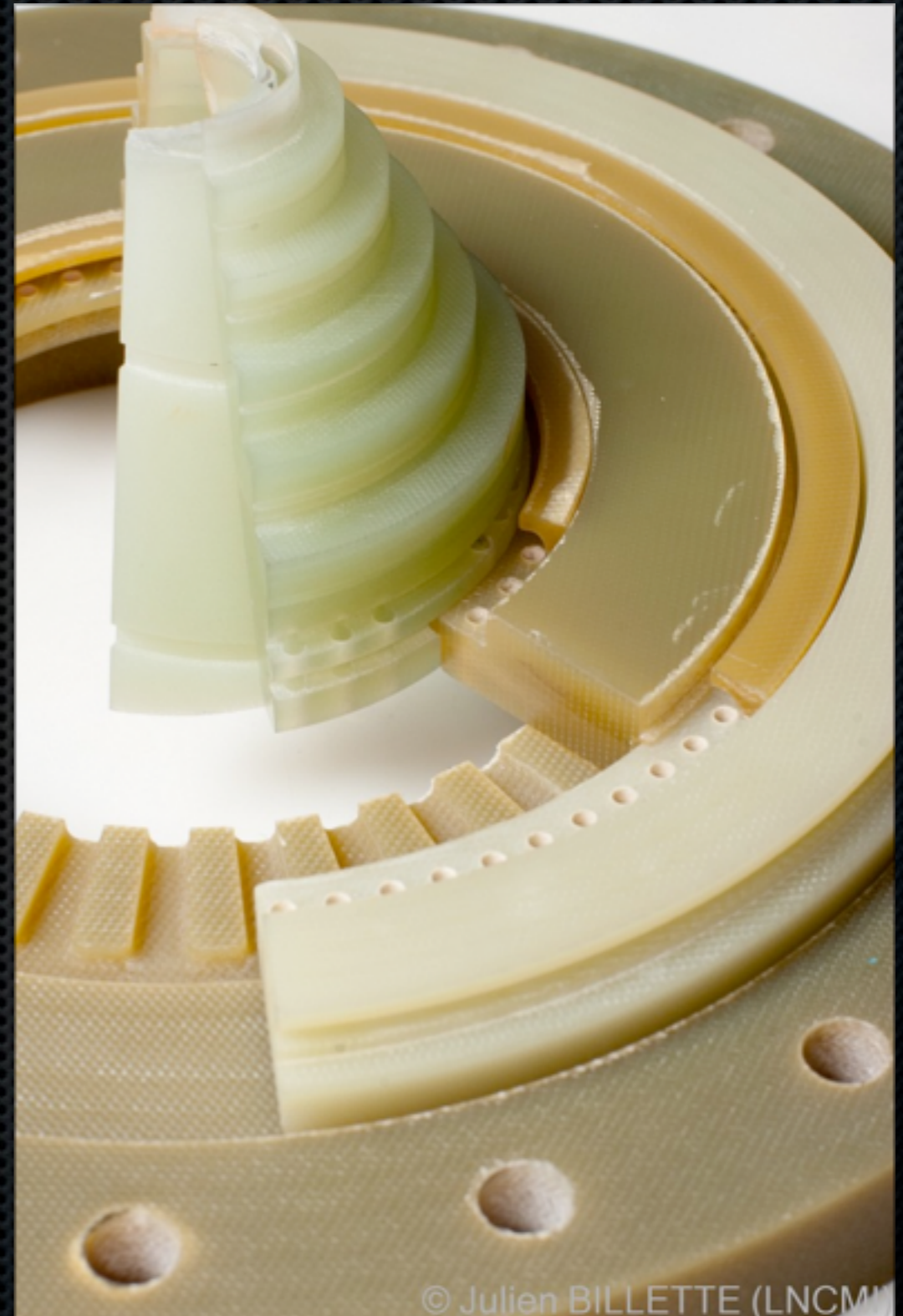
## ✦ Specifications

- ✦  $\pm 15^\circ$  incident beam access (horizontally)
- ✦  $\pm 30^\circ$  scattered beam access (horizontally)
- ✦ 40 Tesla produced with 1.15 MJ power supply
- ✦ 10-15 pulses per Bragg peak (instead of 100-200)
- ✦  $\varnothing 8$  mm max sample size, 1.5 to 300 K



# 40T Coil

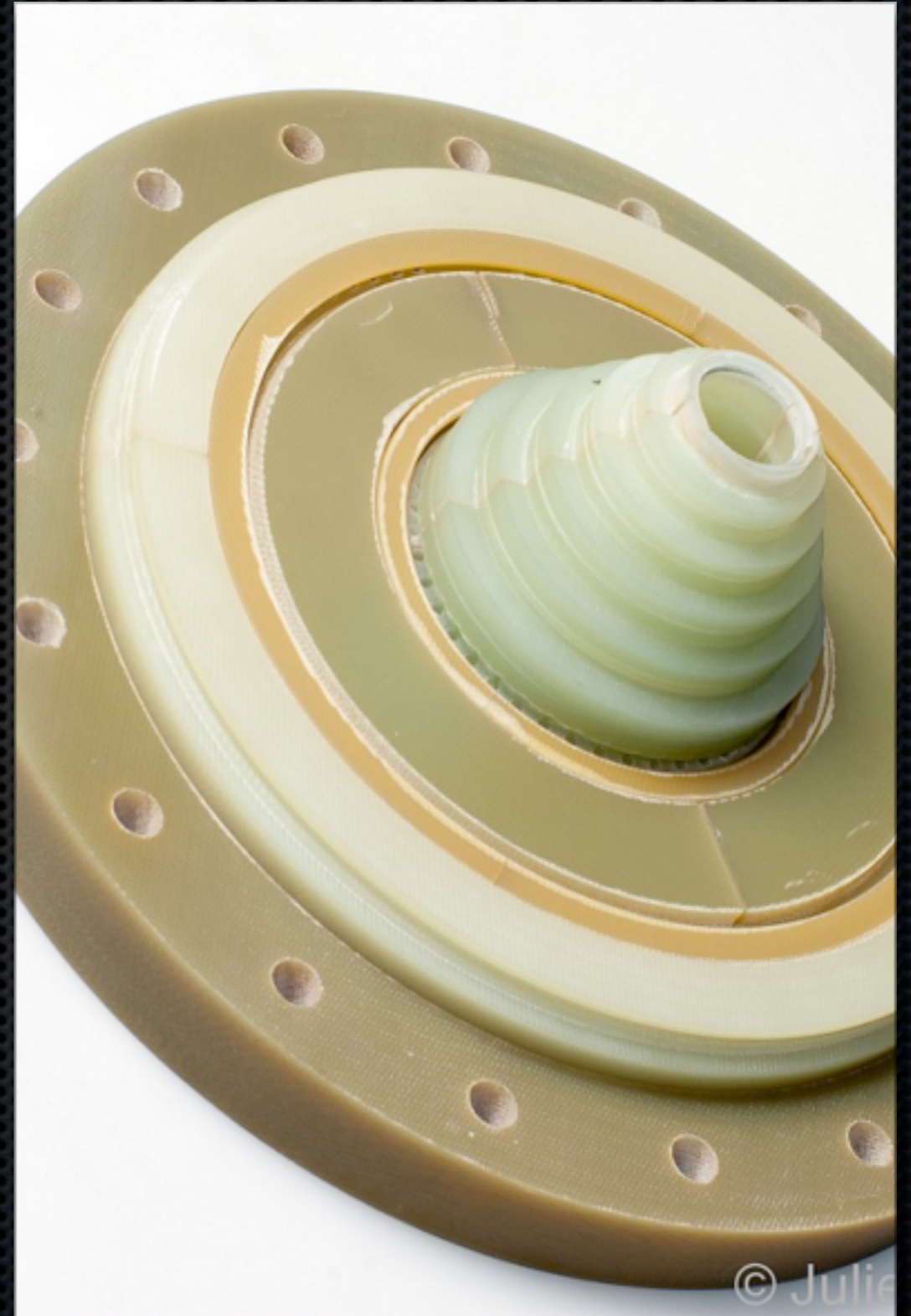
- ✦ Coil wound on G10/FR4 fibre glass epoxy:
  - ✦ Extremely high mechanical strength
  - ✦ Good dielectric loss properties
  - ✦ Good electric strength properties



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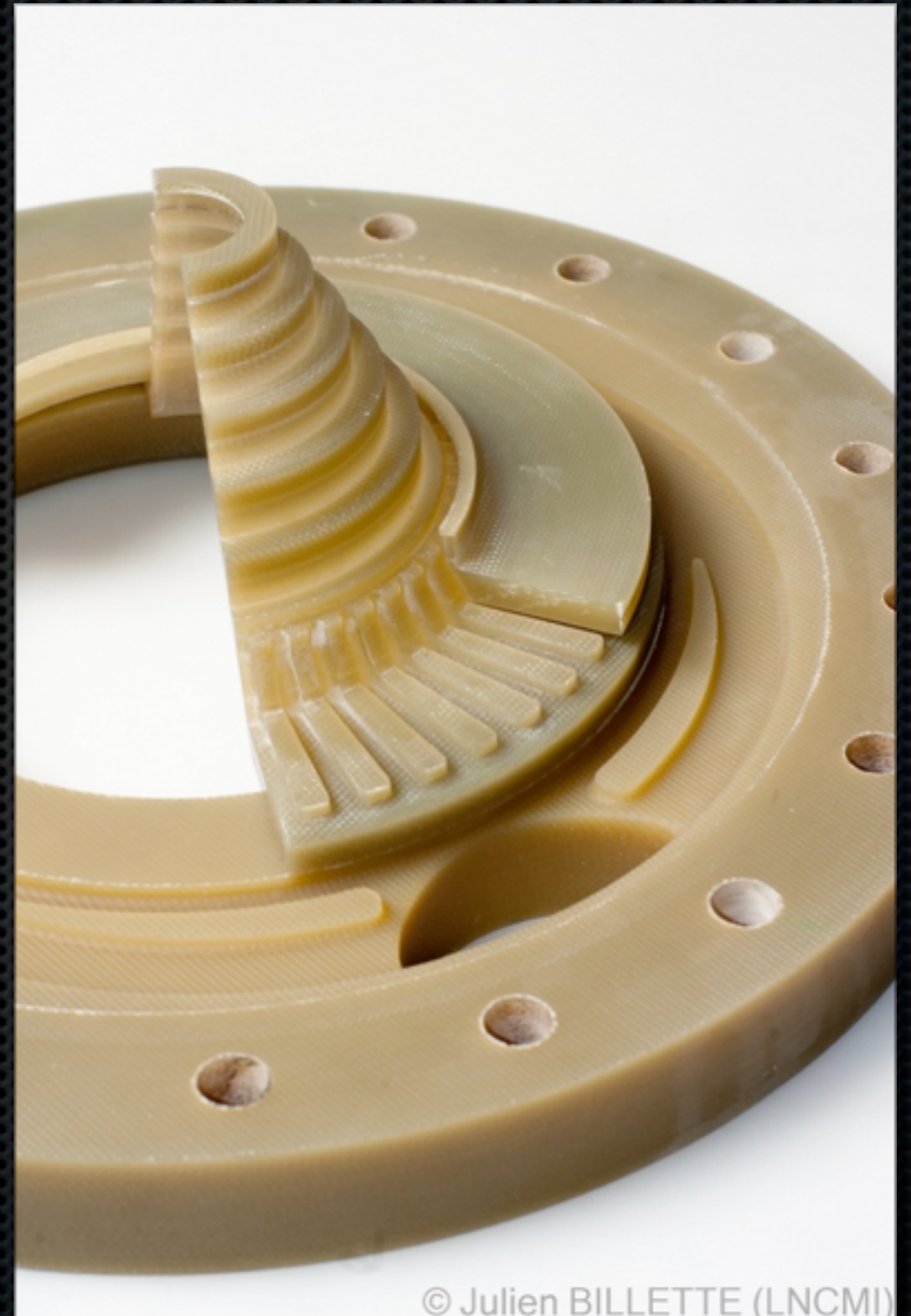
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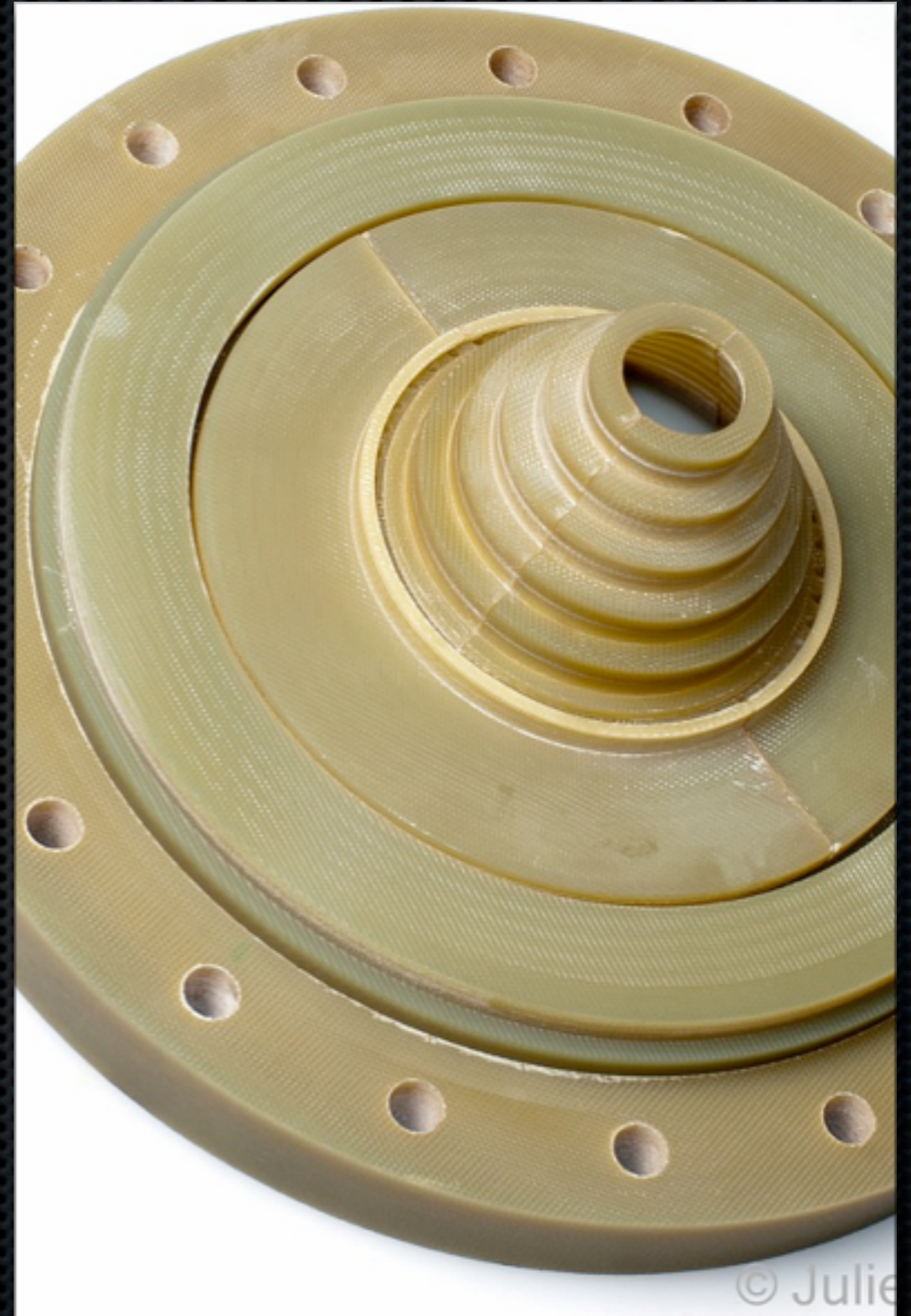
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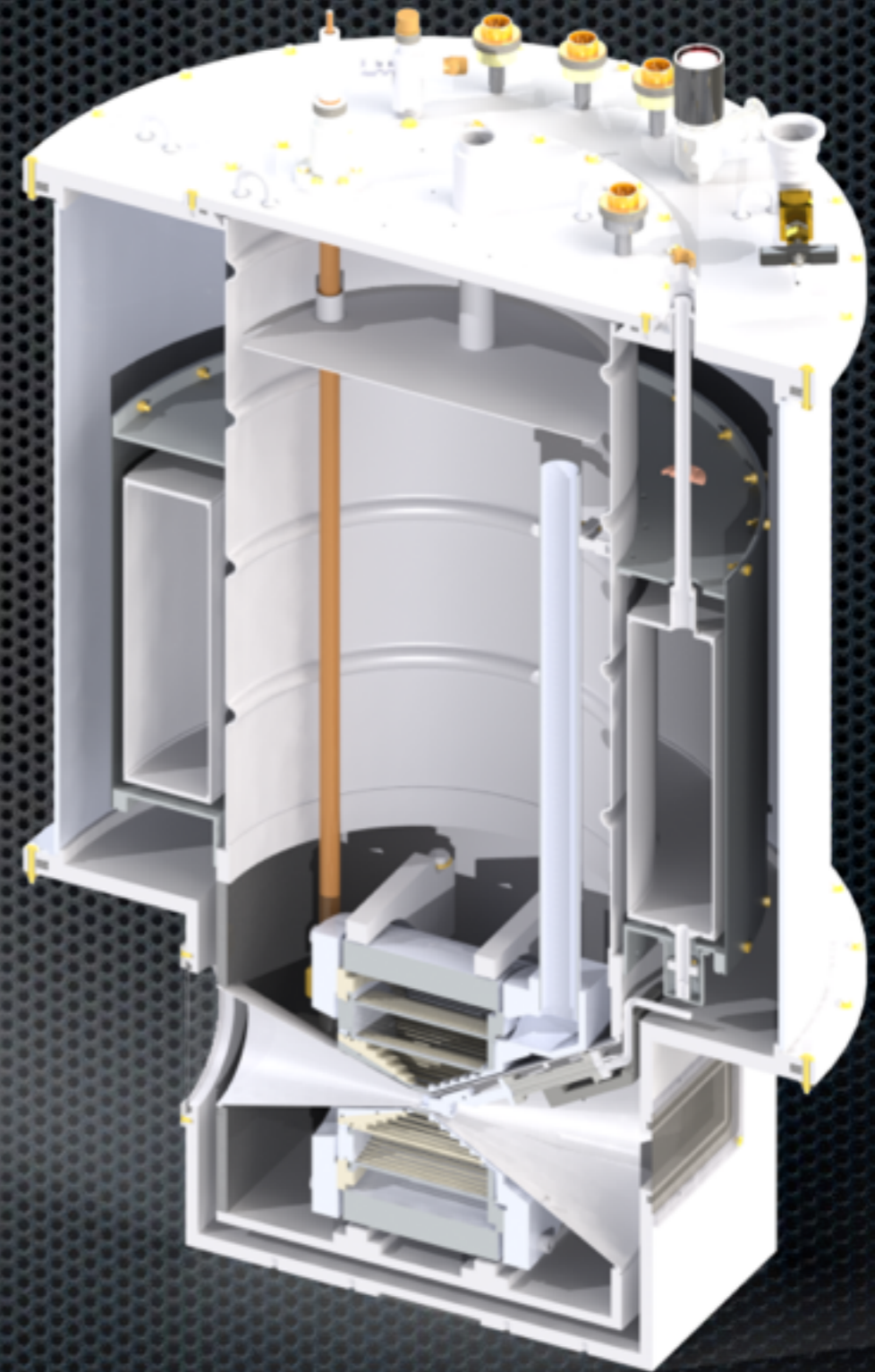
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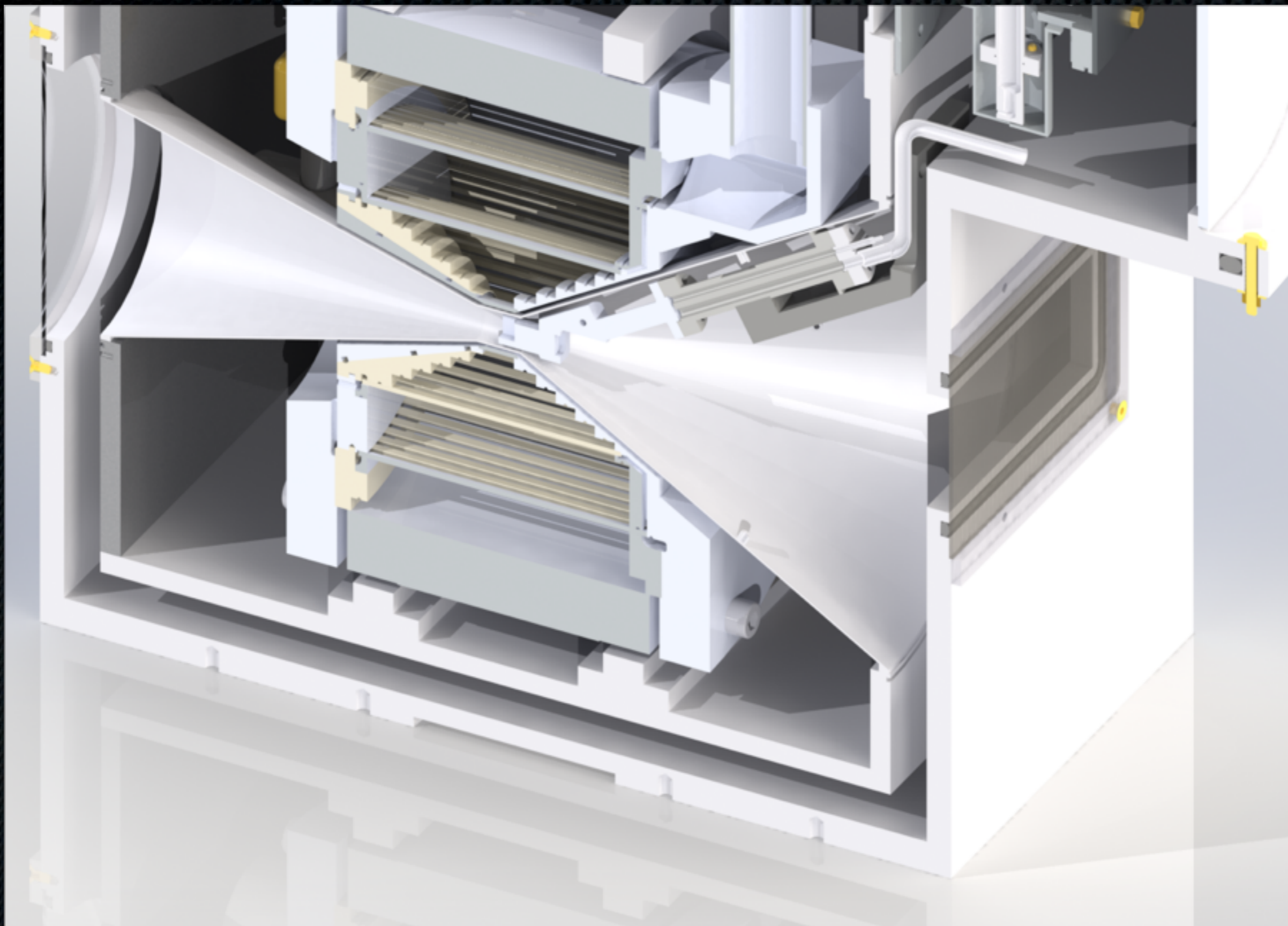


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# 40T Cryostat

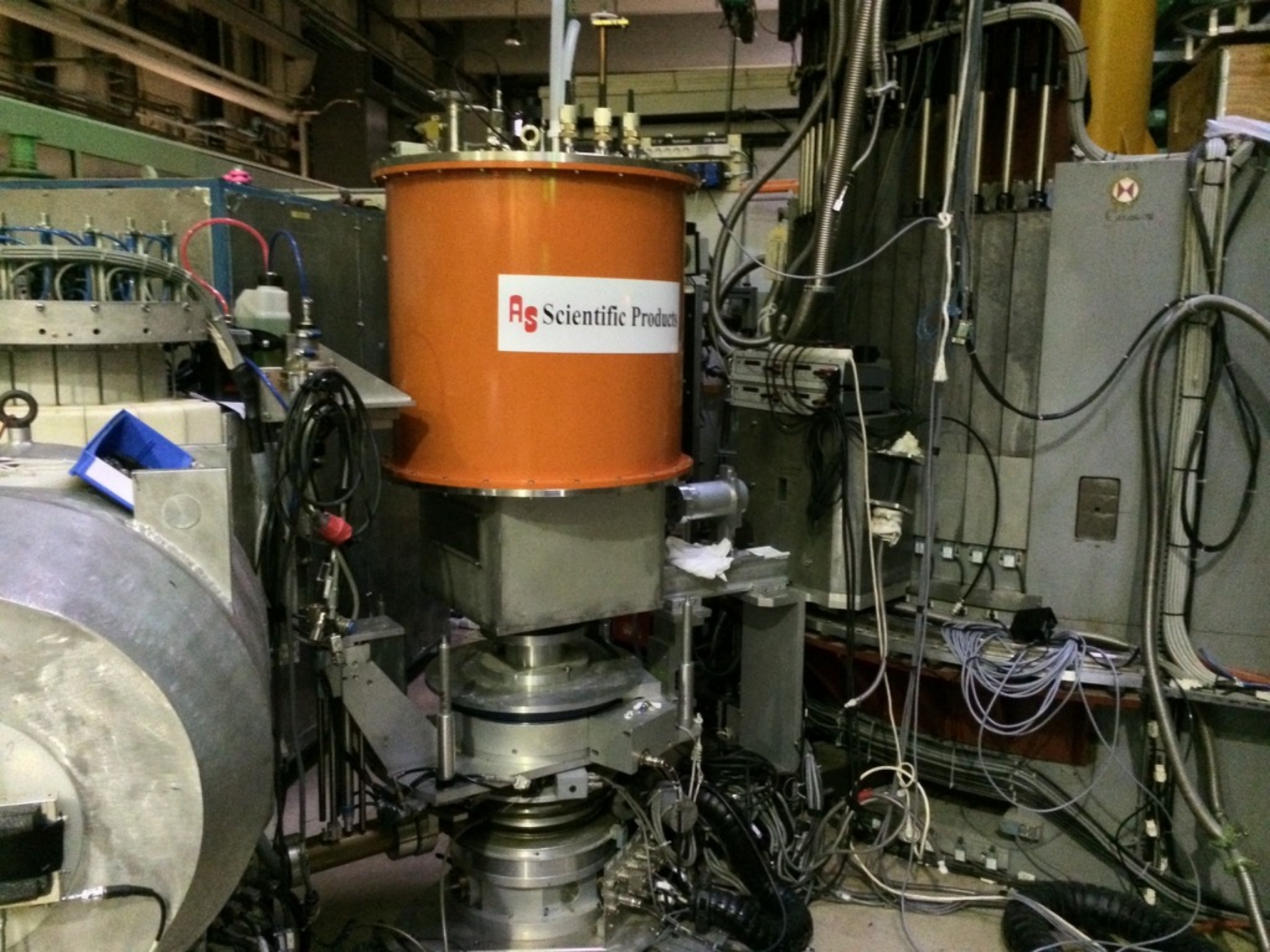
- ✦ Easy access to the coil for replacement
- ✦ Large volume of LN<sub>2</sub>
- ✦ Silicon windows to reduce background
- ✦ Avoid Eddy currents with Torlon & sapphire





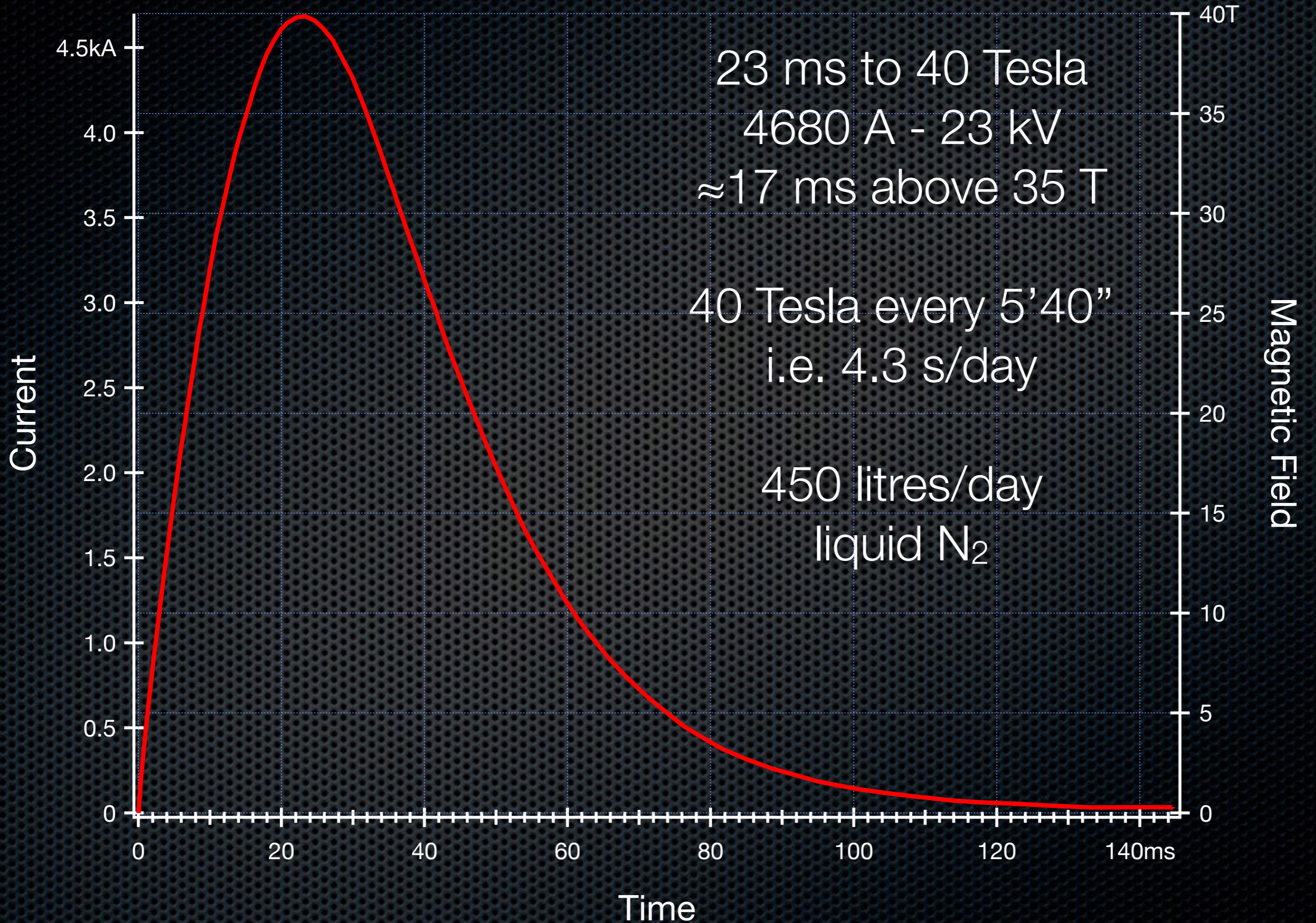
# 40T Commissioning

- ✦ Tests performed on the TAS IN22
  - ✦ 1 mm field offset compensated with cold finger
  - ✦ No magnetic force detected at 31 Tesla
  - ✦ 80  $\mu\text{m}$  vertical movement detected at 31 Tesla
  - ✦ 1 hour initial cool down
  - ✦ No issue with detector electronics



As Scientific Products

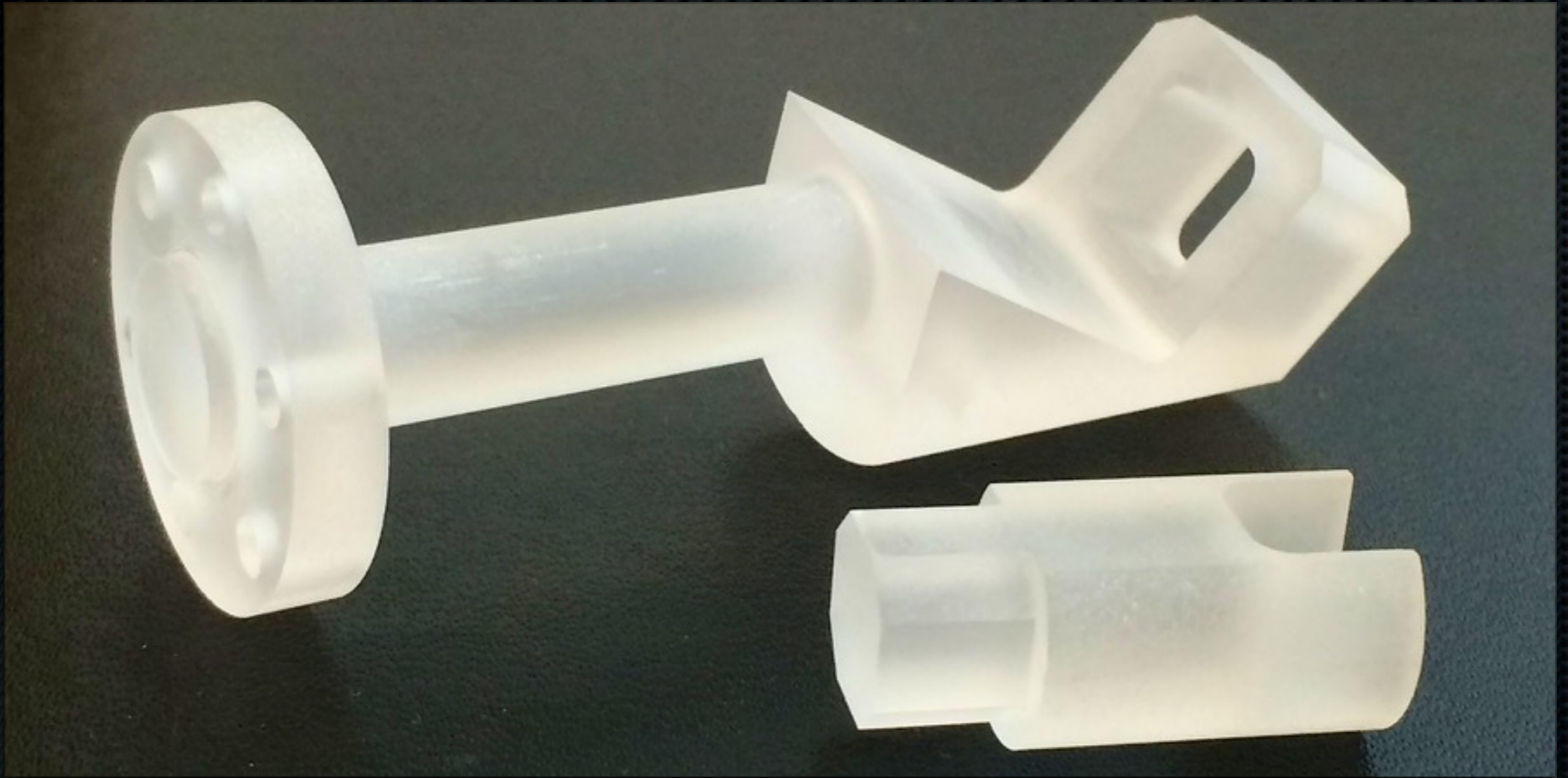
Creston



# 40T Commissioning

- ✦ PSD detector from Dubna — 3.000.000 n/s max
- ✦ 1024 channels sampling — 120  $\mu$ s/channel
- ✦ MnO magnetic peak at 15.000 n/s —  $I(B) = C^{te}$ 
  - ✦  $\sim 1.5$  n/channel  $\Rightarrow \sim 16$  n x 1024 ch. for 11 pulses
- ✦ URu<sub>2</sub>Si<sub>2</sub> magnetic peak at 2.000 n/s —  $I(B) \neq C^{te}$ 
  - ✦  $\sim 0.2$  n/channel  $\Rightarrow \sim 10$  hours for 100 pulses at 35 T





# Cold finger in sapphire

Joule-Thomson expansion directly on the finger

*Special thanks to...*

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*L.-P. Regnault  
CEA — Grenoble*

*E. Lorenzo  
CNRS — Grenoble*