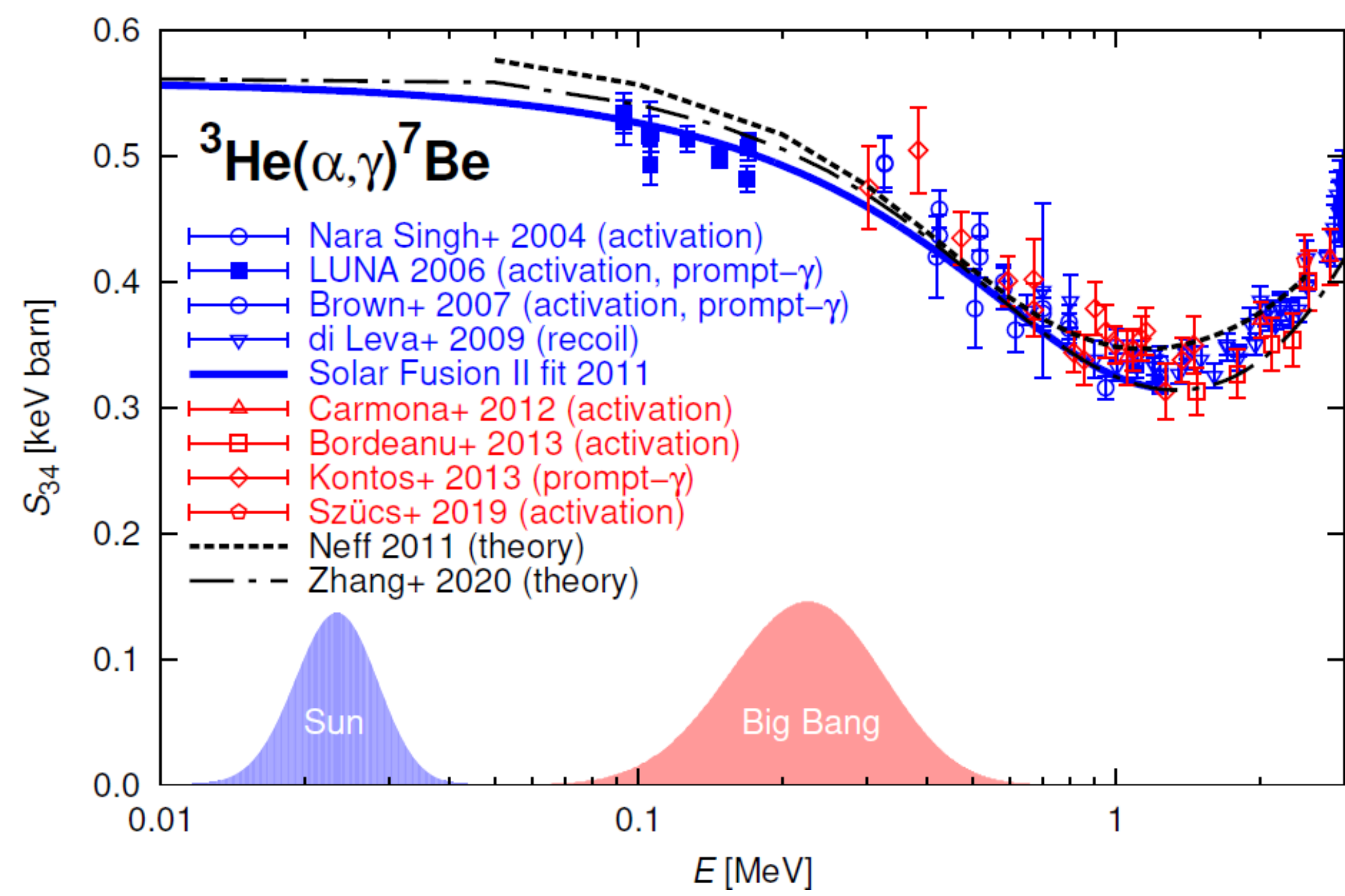


Development of a gas jet target system for the Felsenkeller underground accelerator

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1. Motivation

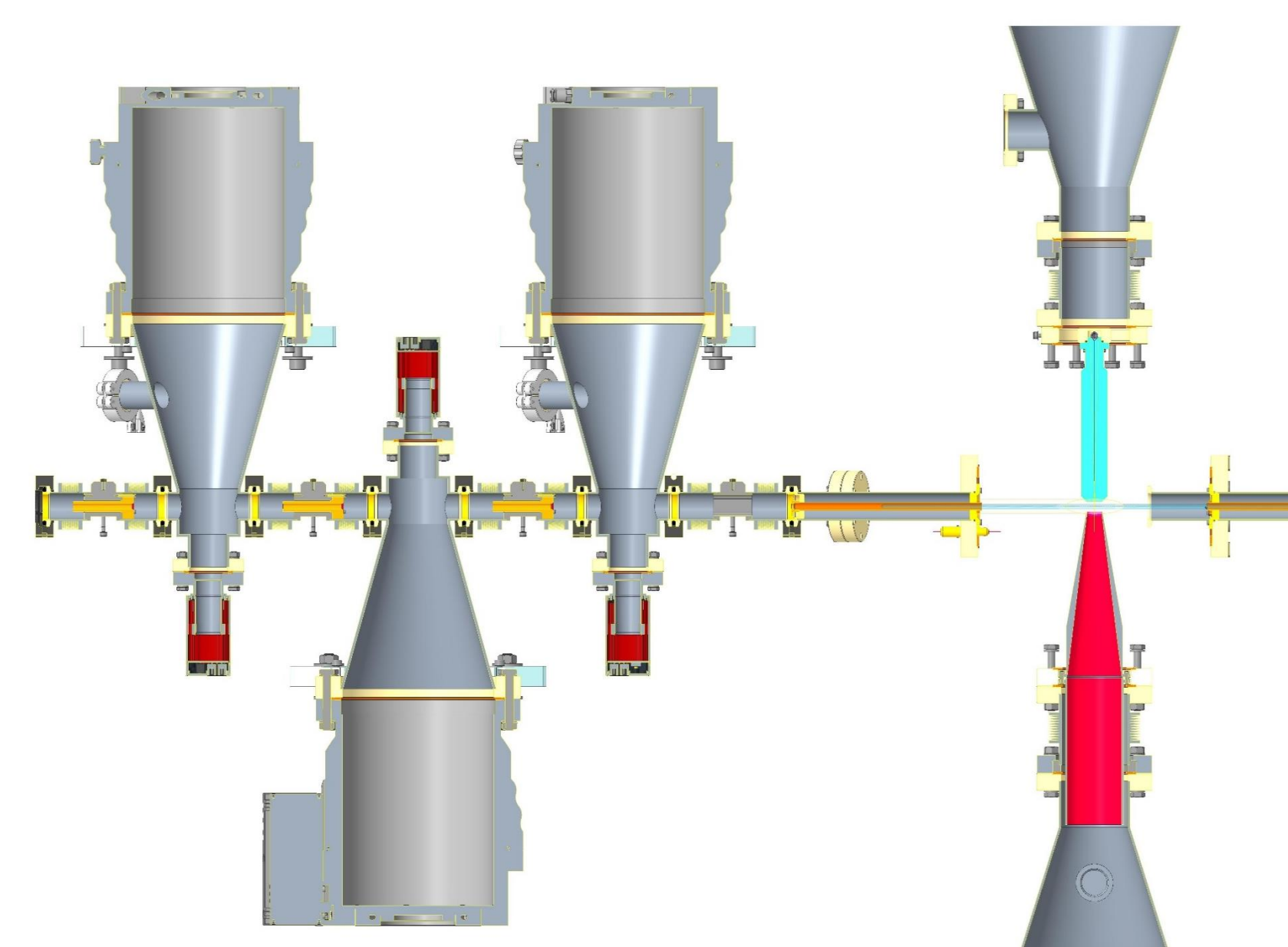
- ³He gas target for comprehensive data coverage of the entire BBN range (cosmic lithium problem)



- Wall jet gas target for angular distribution measurements
- ¹²C(α, γ)¹⁶O potential for Felsenkeller with ¹²C+ beam, extended windowless ⁴He gas target, γ -calorimeter, and 4π detector

2. Differential pumping stages

- Catcher collects the bulk of the jet
- The expansion chamber is attached to a pumping system to keep a constant pressure

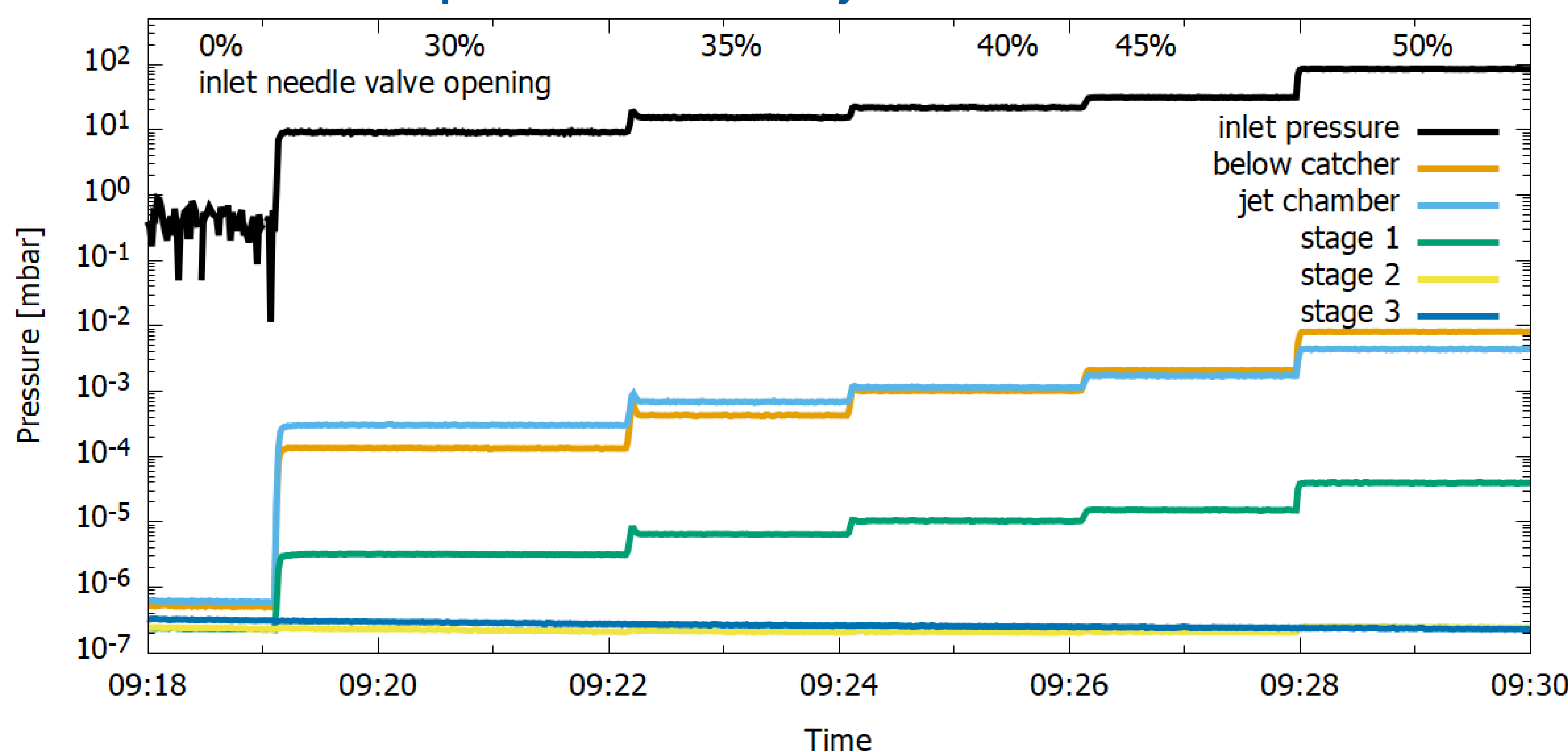


3. Wall jet gas target

- Based on JENSA gas jet target [1]

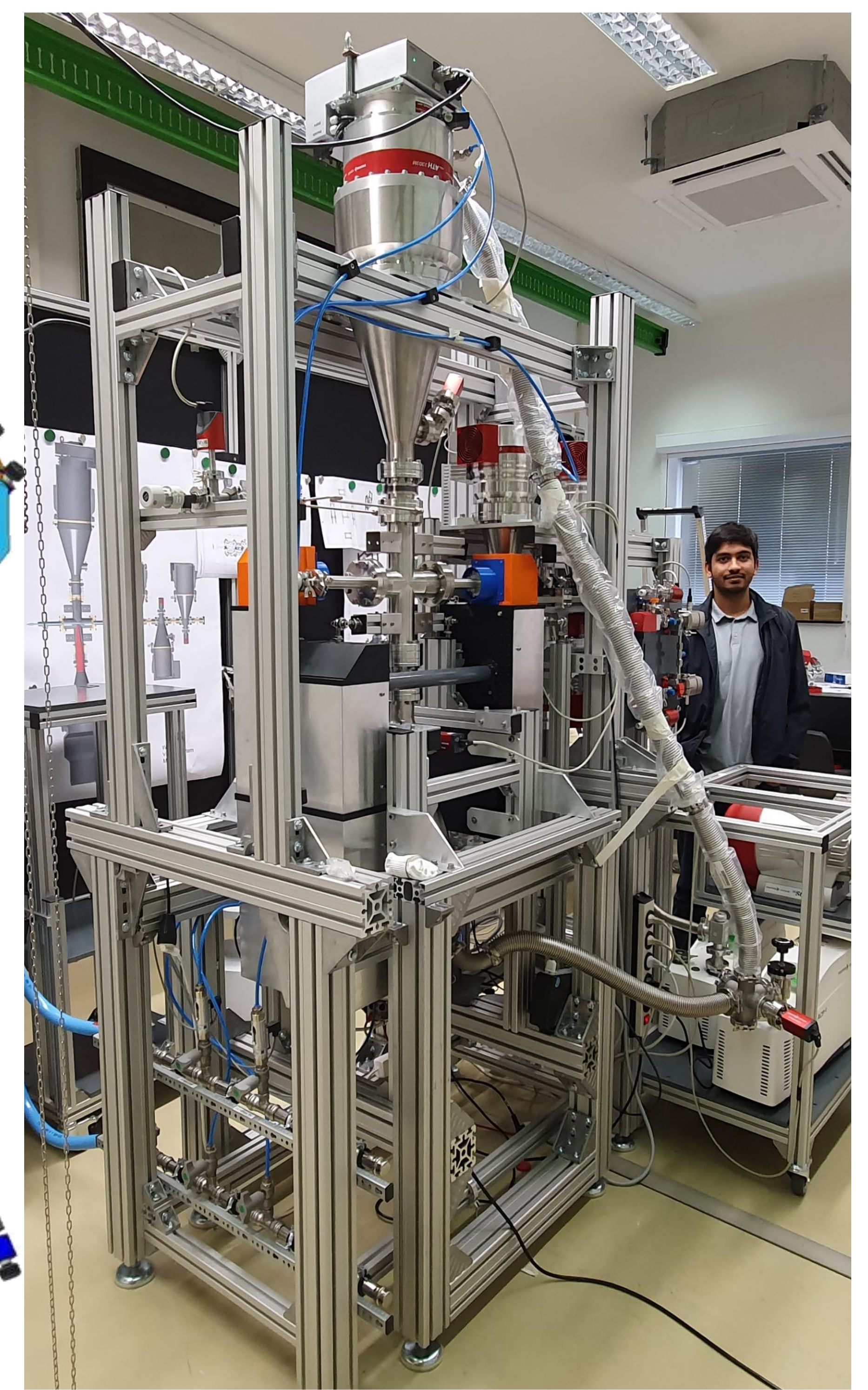
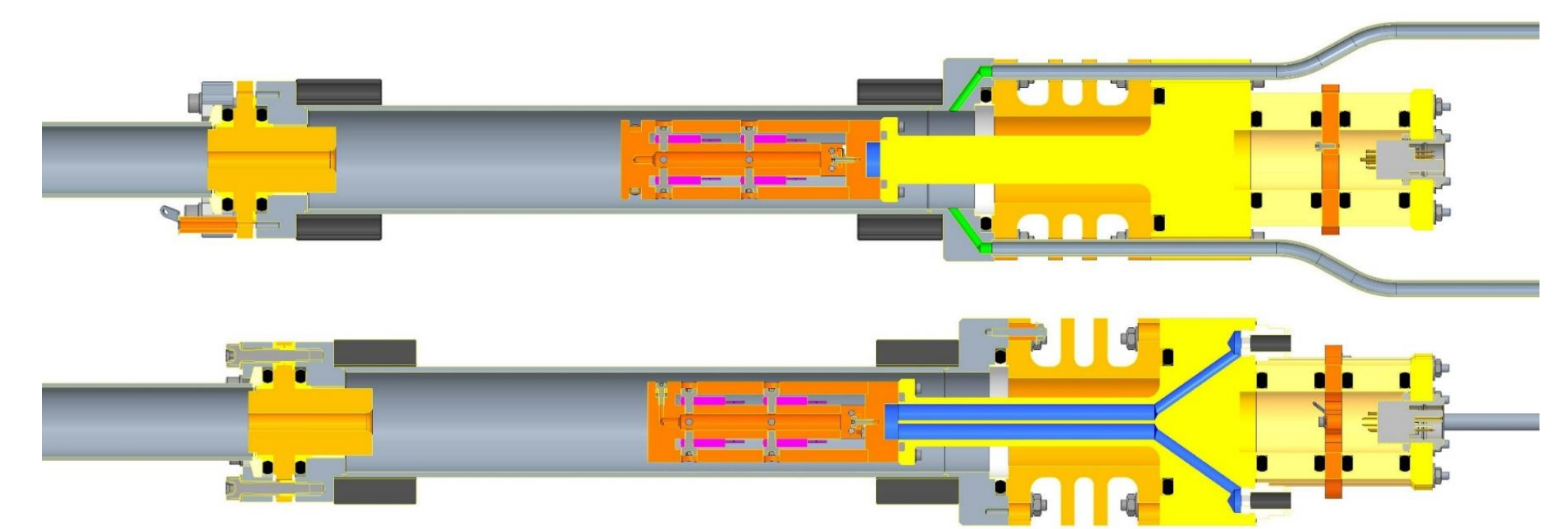
Density	10 ¹⁸ atoms/cm ²	Single resonance measurement
Thickness	0.1 mm	Reaction localization
Width	10 mm	Beam size 5 mm
Inlet pressure	~1 atm	To get a supersonic jet
Mass flow	1.4 l/s	Caused by nozzle geometry

4. Pressure profile of first jet tests



5. Static gas target with calorimeter

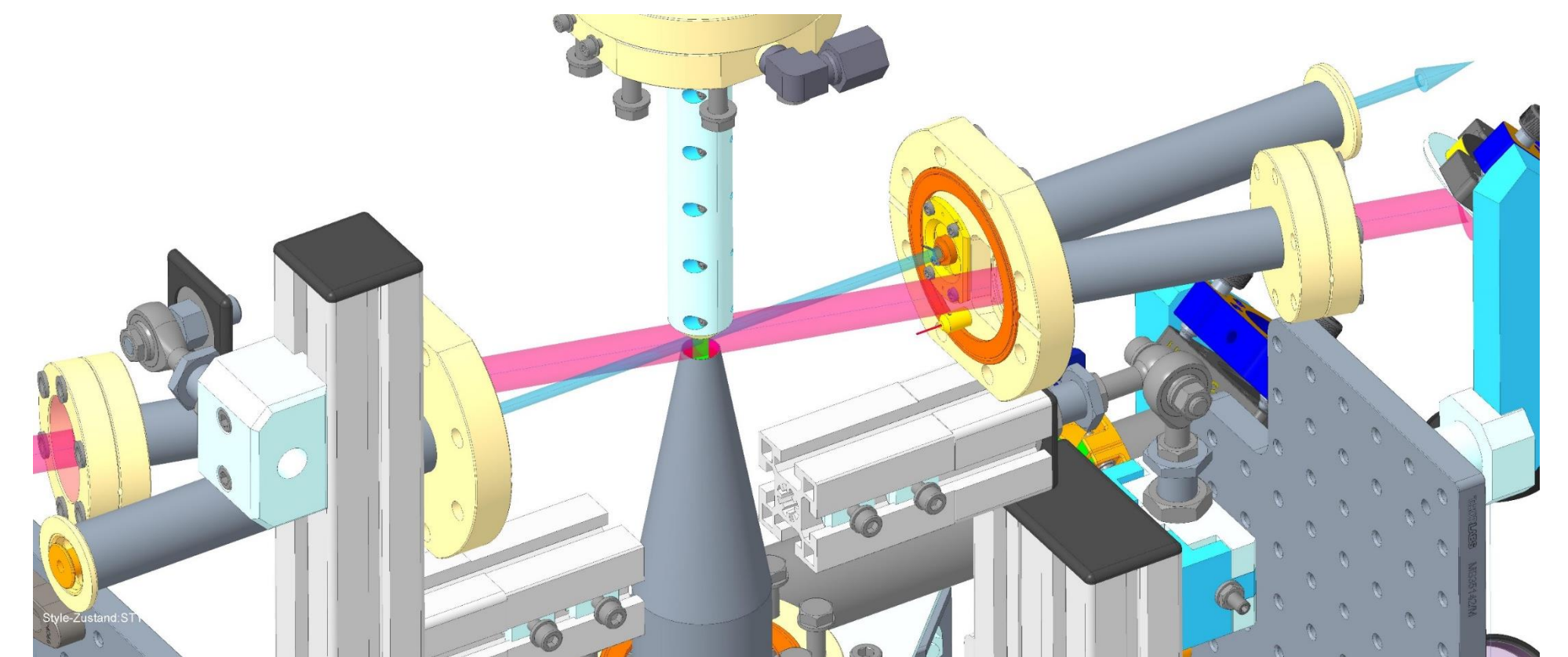
- Based on LUNA gas target setup [2]
- Target pressure ~ 2.0 mbar
- Calorimeter for beam intensity measurement



All 7 pumps are assembled and working

6. Laser interferometry

- Optical path length difference (interferogram) for target density measurement [3]



7. Work in progress

- The combined gas target has been built
- Characterization of jet density
- Nozzle development
- Recirculation of gas

8. References

- [1] Schmidt et al., NIM A 911, 1–9 (2018)
- [2] Ferraro et al., Eur. Phys. J. A (2018) 54: 44
- [3] Couperus, Irman et al., NIM A 830, 504 (2016)

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