

Numerical Simulation of Fundamental Mode Coupling and Higher Order Modes in PETRA Cavities



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DESY-TEMF-CANDLE Meeting
September 21, 2021
Zoom Meeting



Overview

Fundamental mode coupler

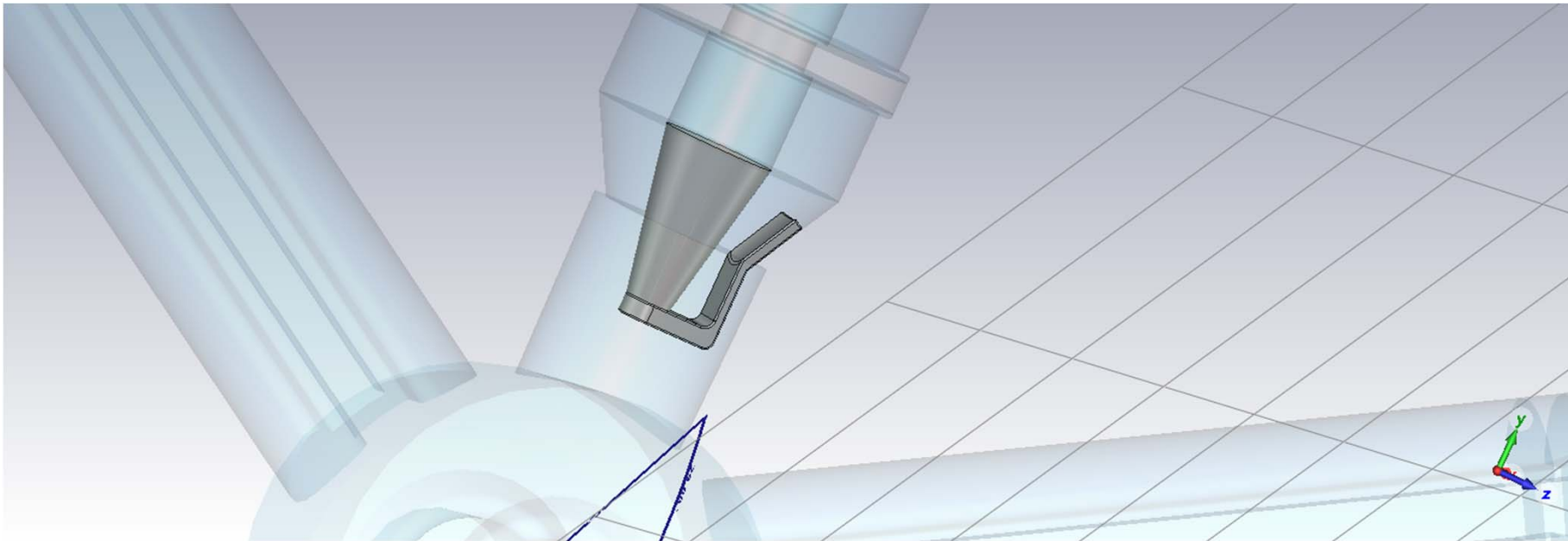
- Improvement of the coupling

Tuning plunger

- Field penetration at the tuner gap
- Accelerating mode and Higher Order Modes

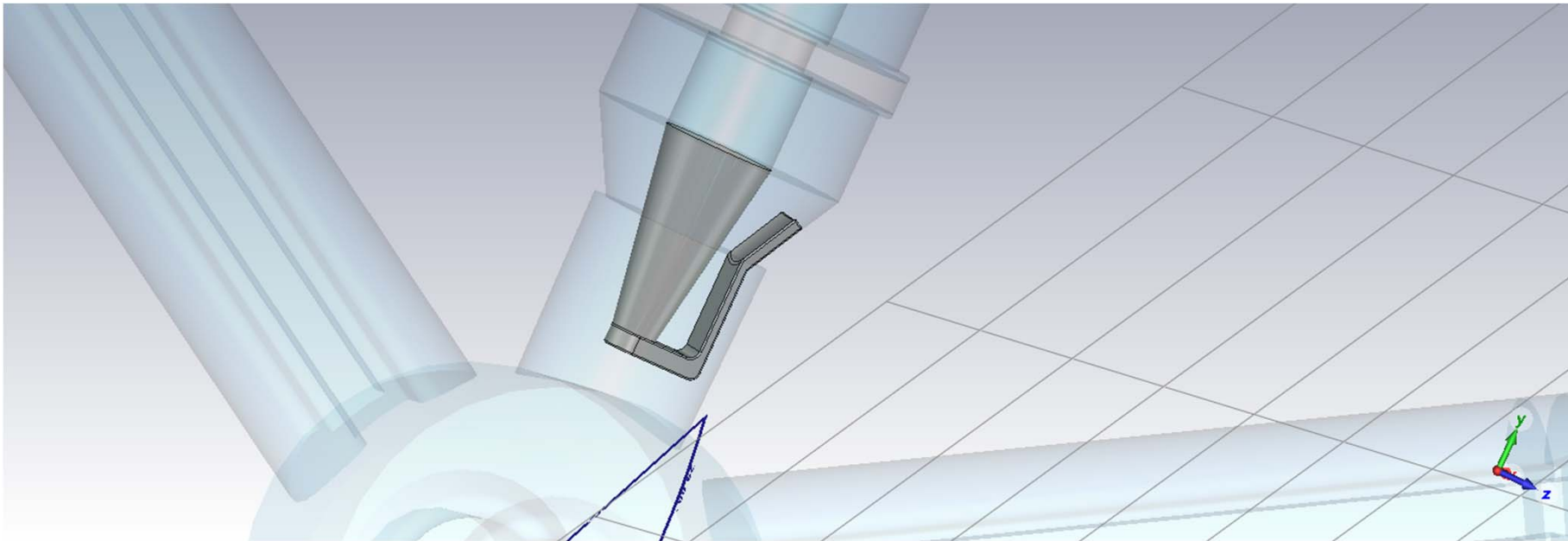
Main Power Coupler

Insufficient Coupling
-> Coupling Loop Position too far away from Cavity



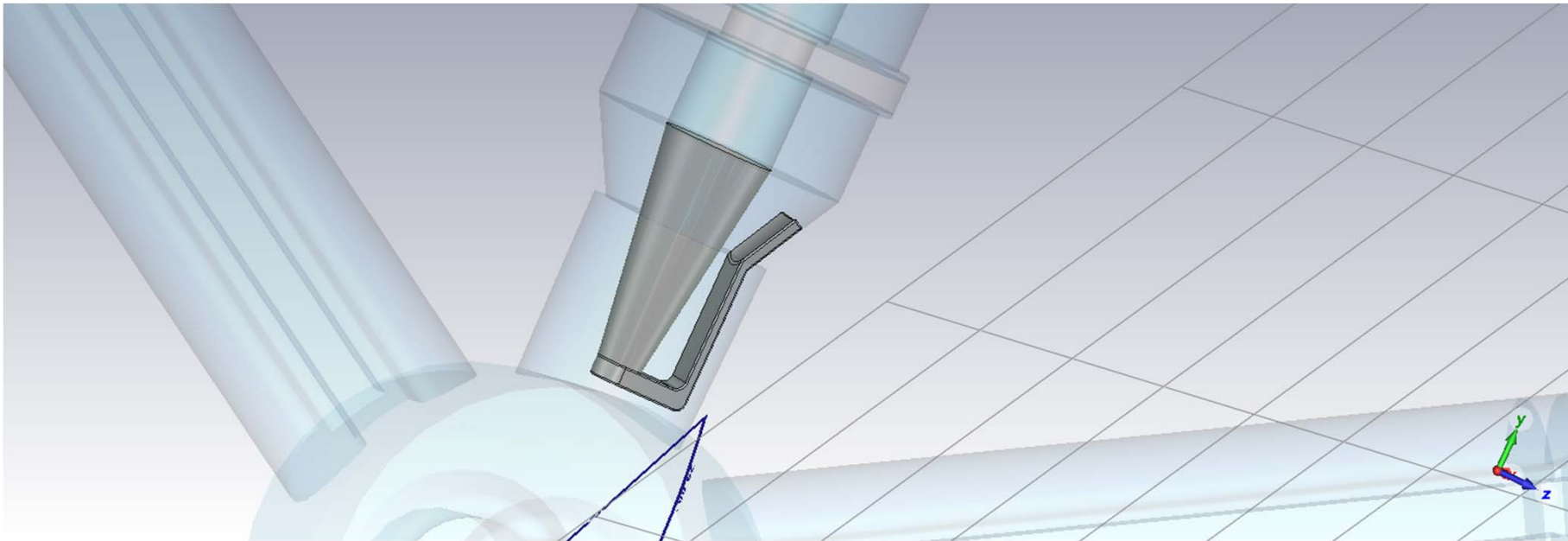
Main Power Coupler

Shifted inside by 10 mm



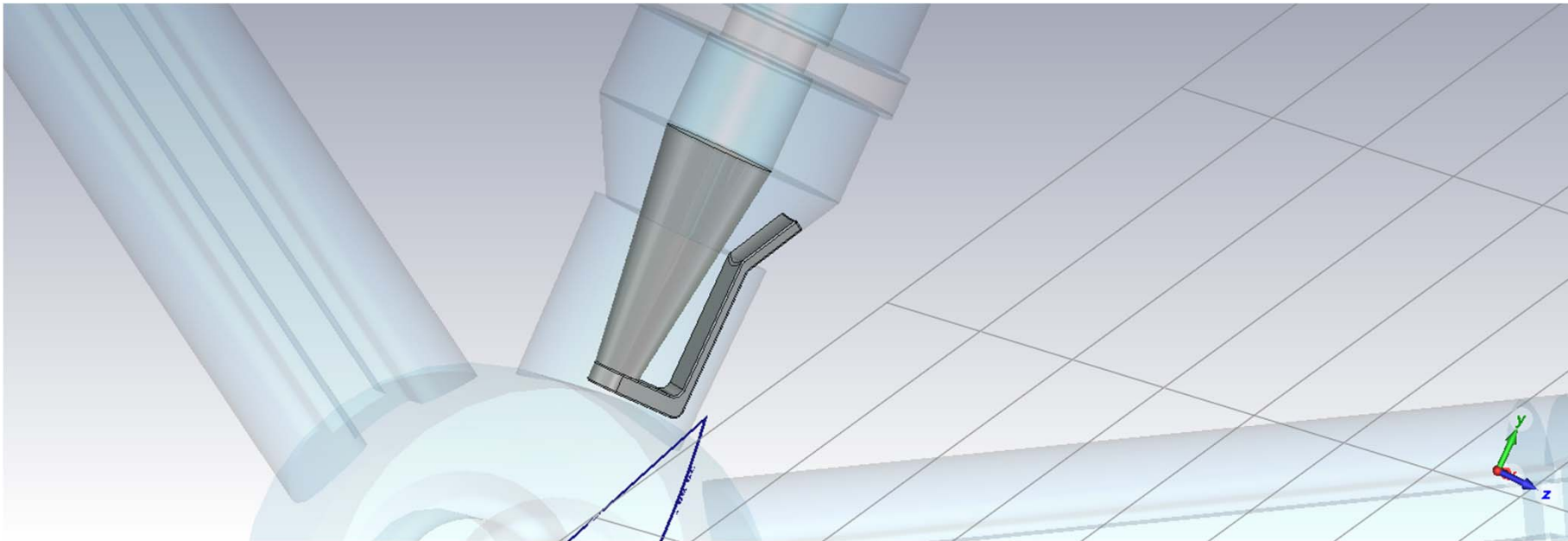
Main Power Coupler

Shifted inside by 20 mm



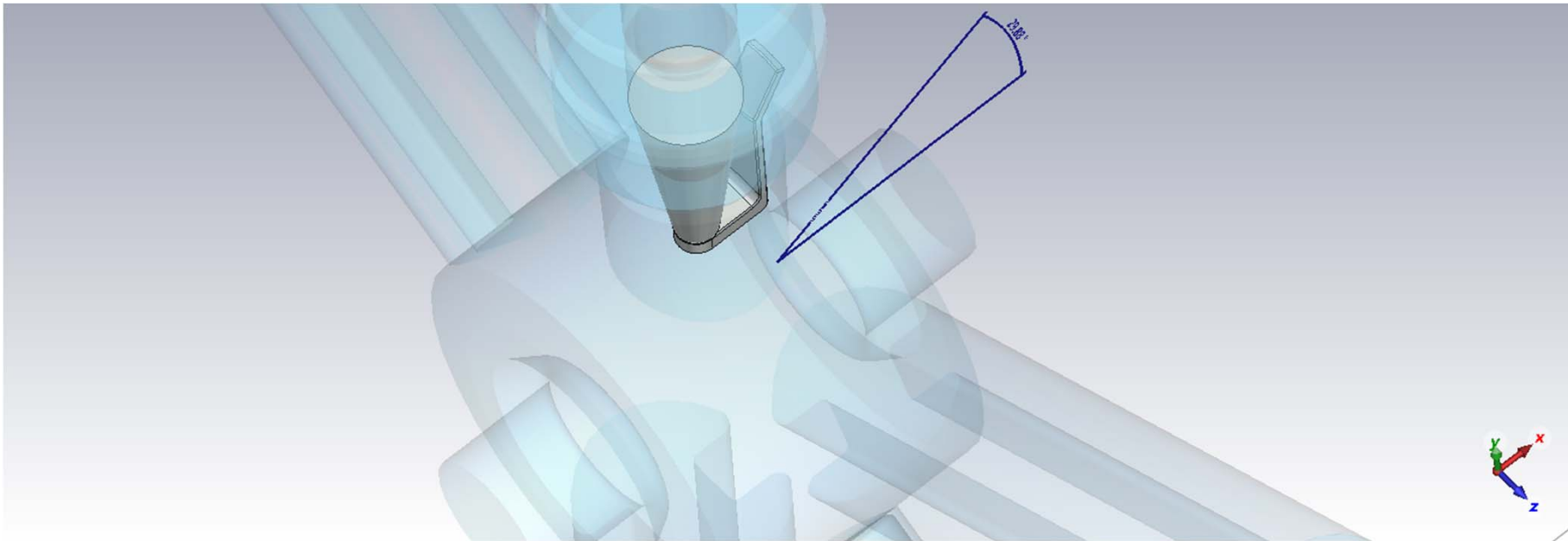
Main Power Coupler

Shifted inside by 22 mm

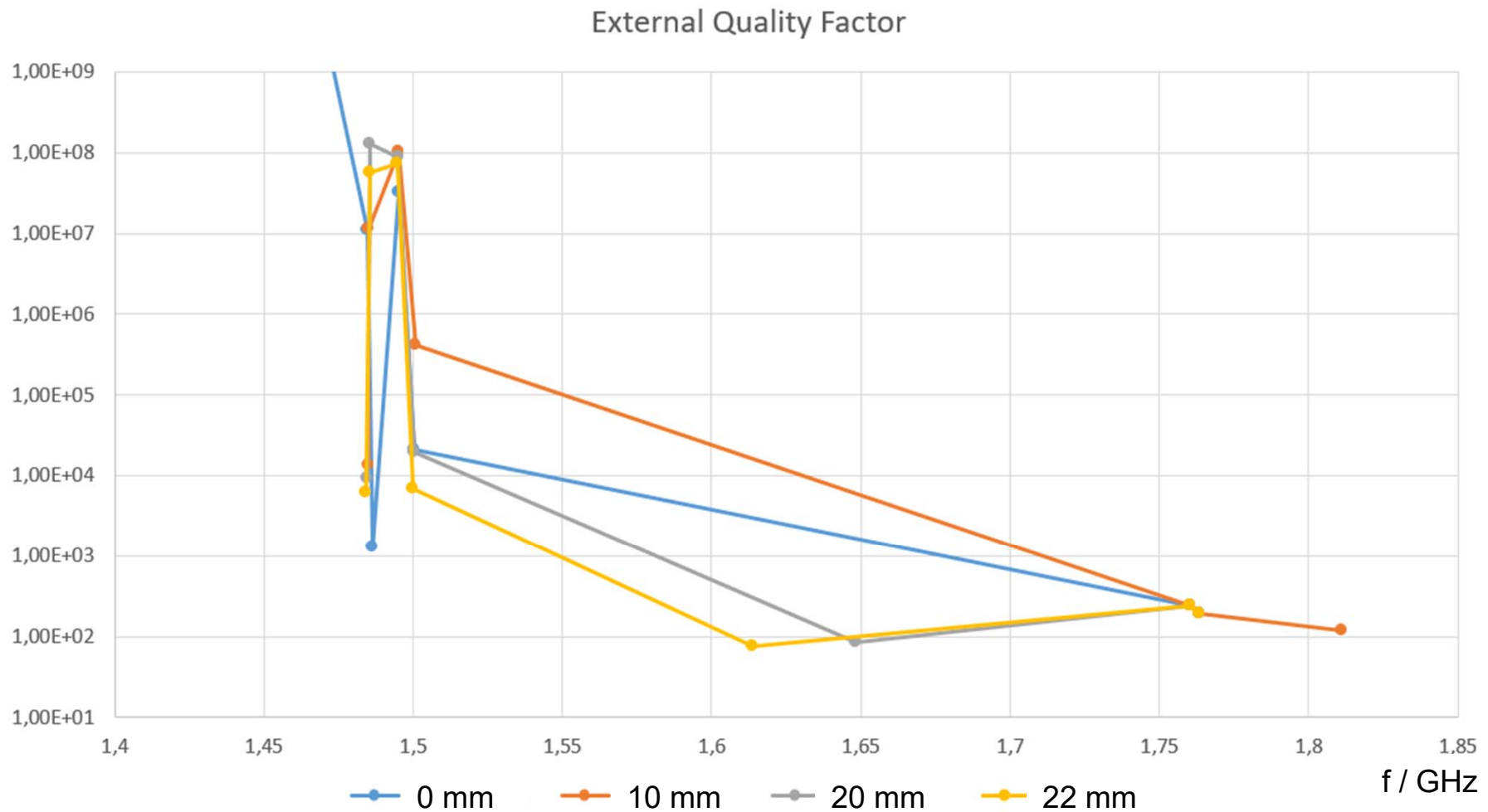


Main Power Coupler

Rotation perpendicular to magnetic flux



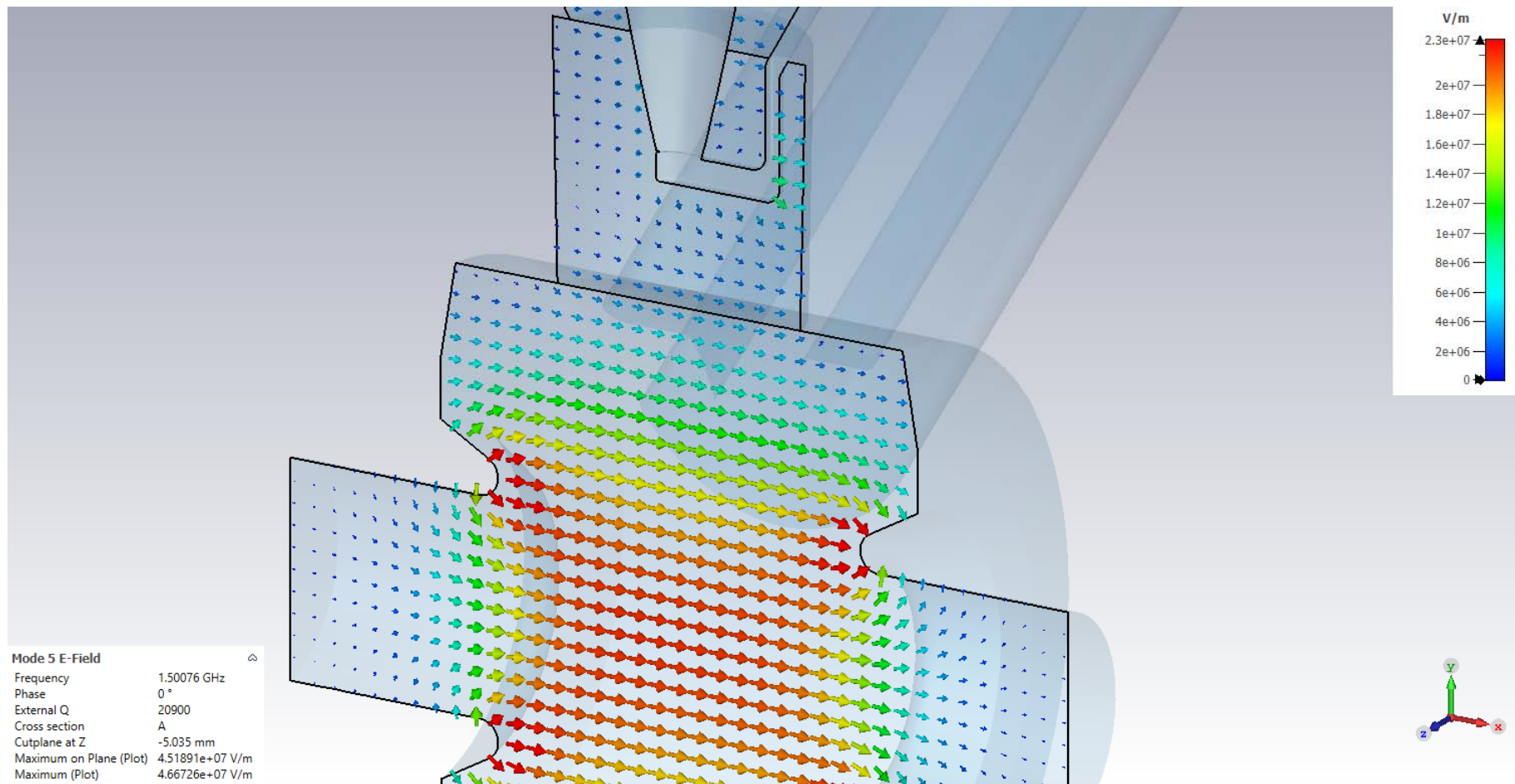
External Quality Factor



Mode Identification



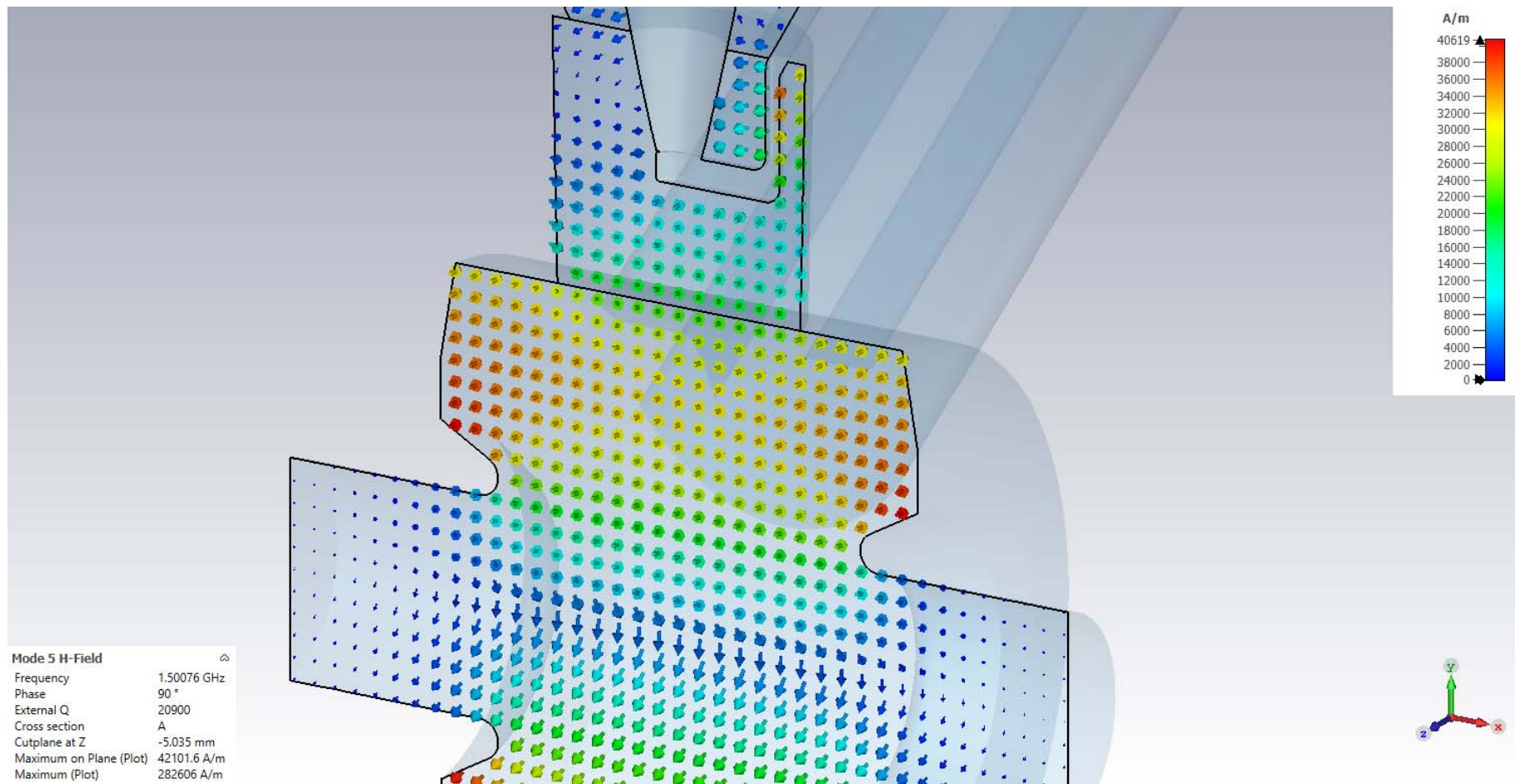
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Mode Identification



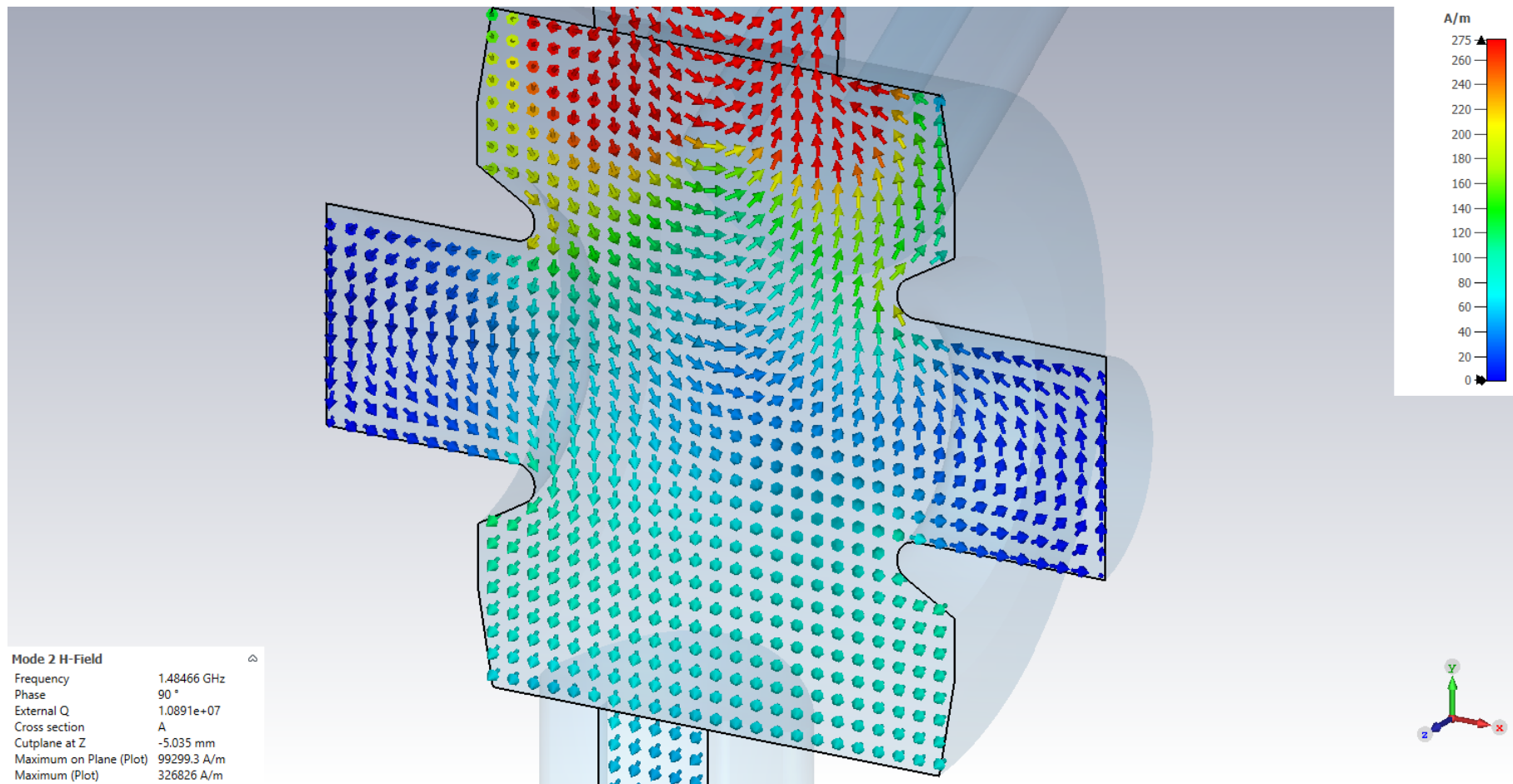
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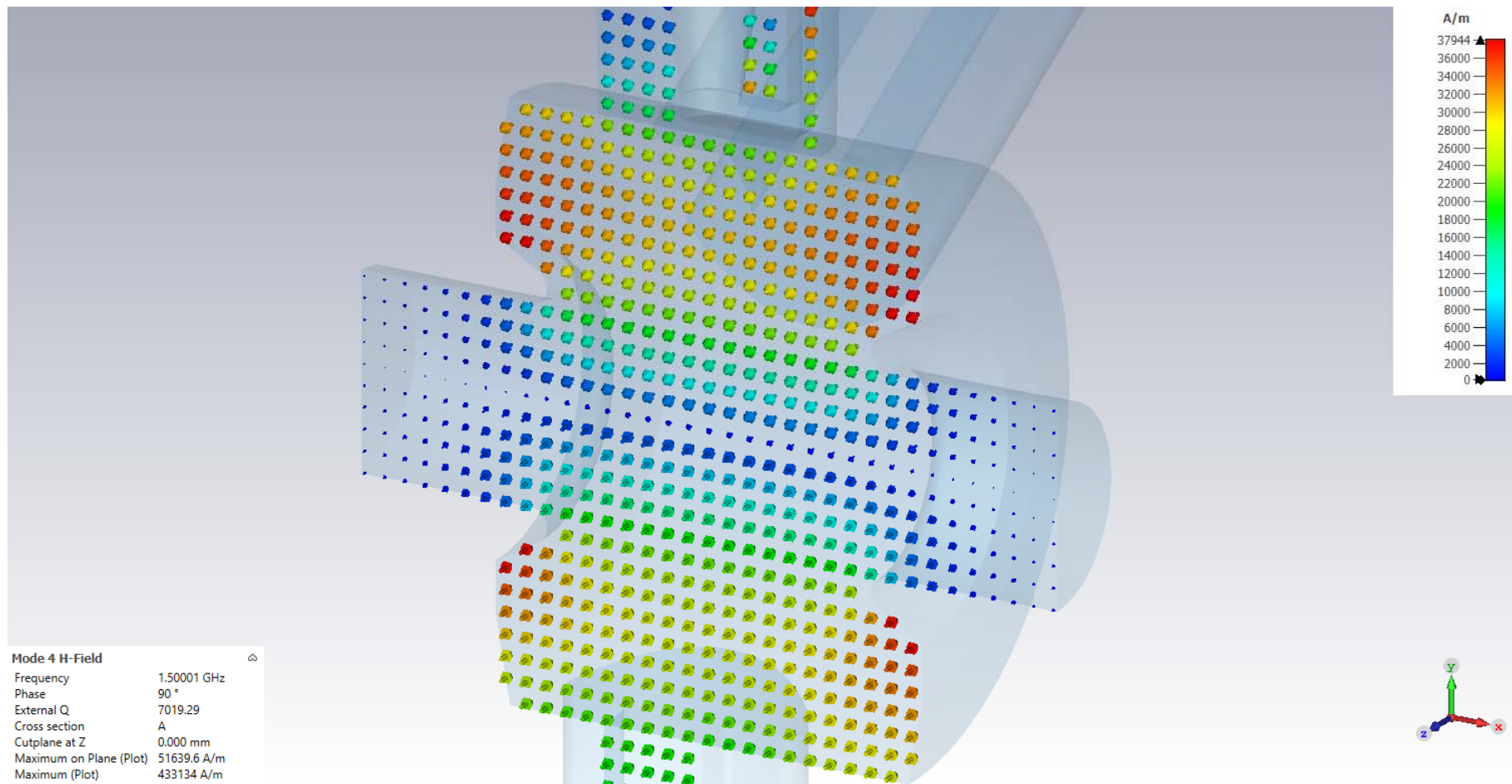
Mode Identification



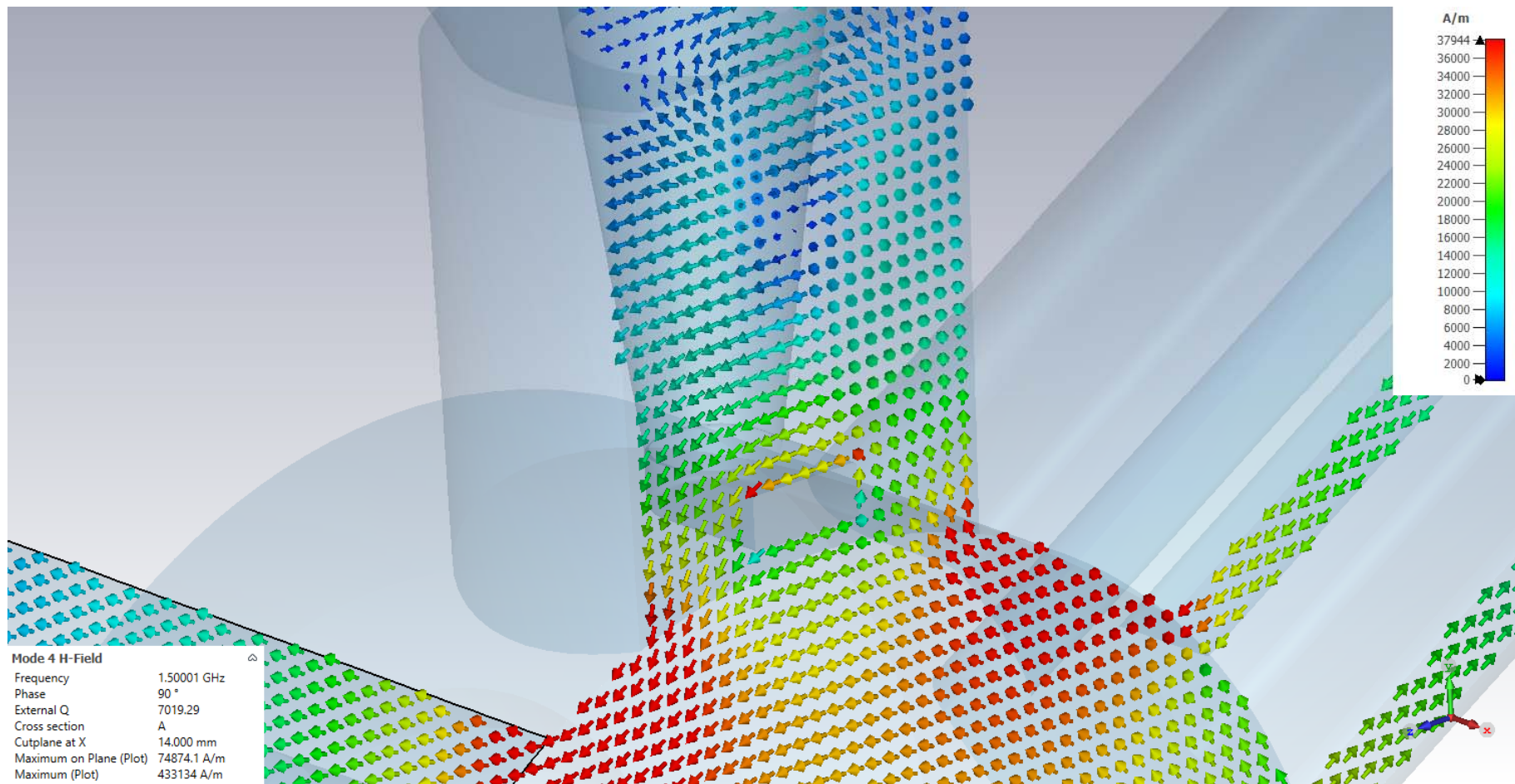
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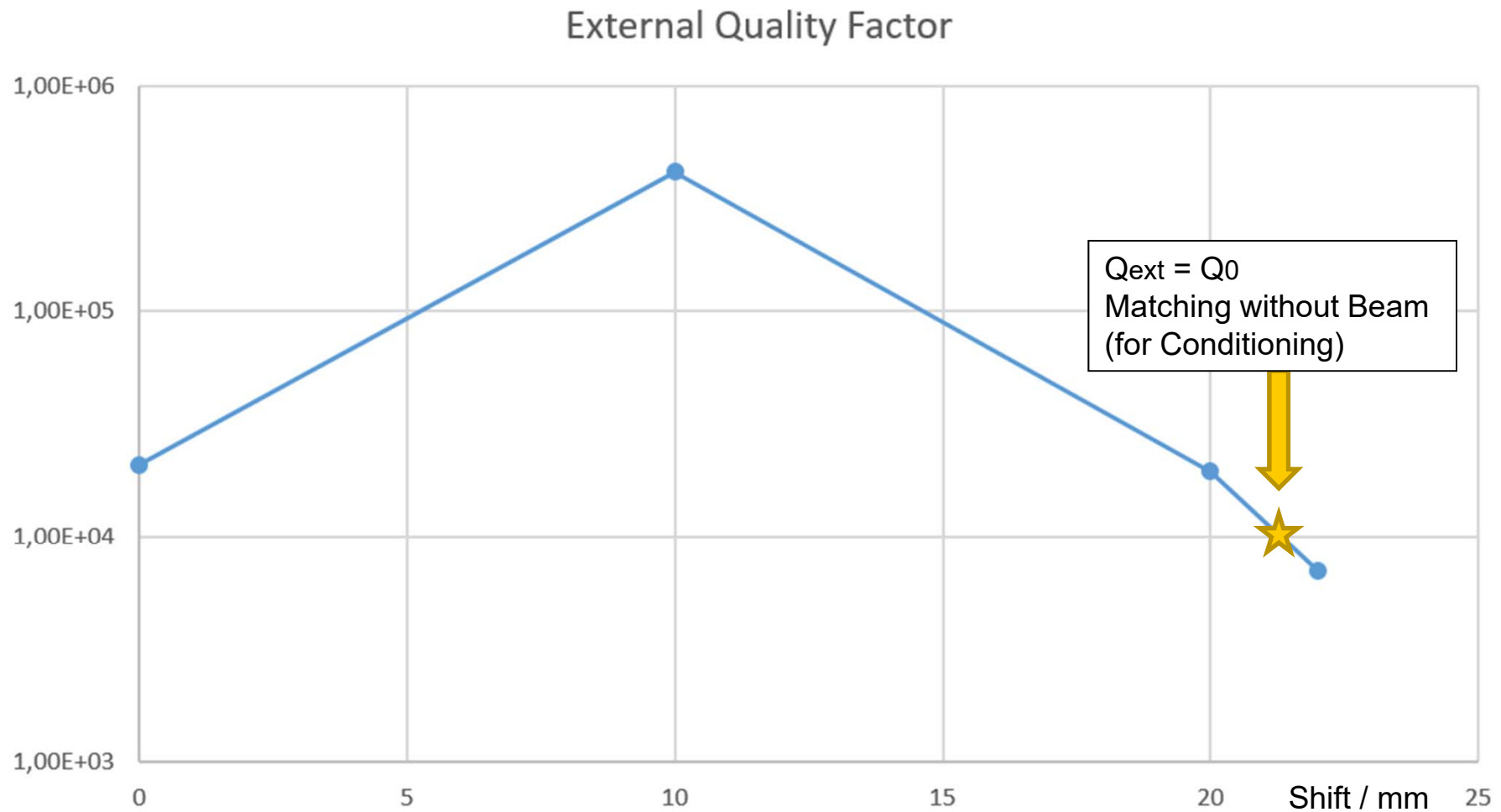
Improved Coupling



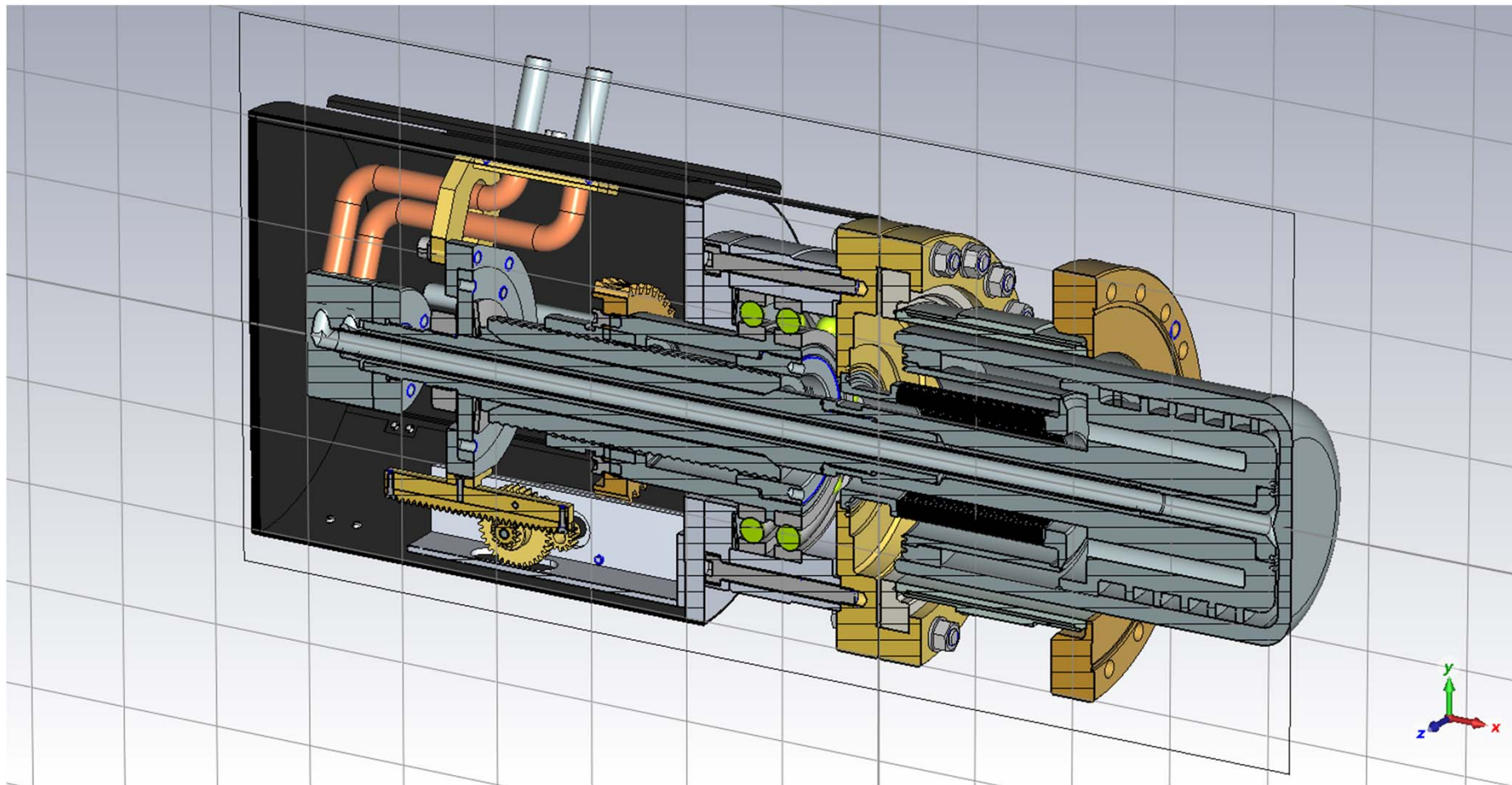
Improved Coupling



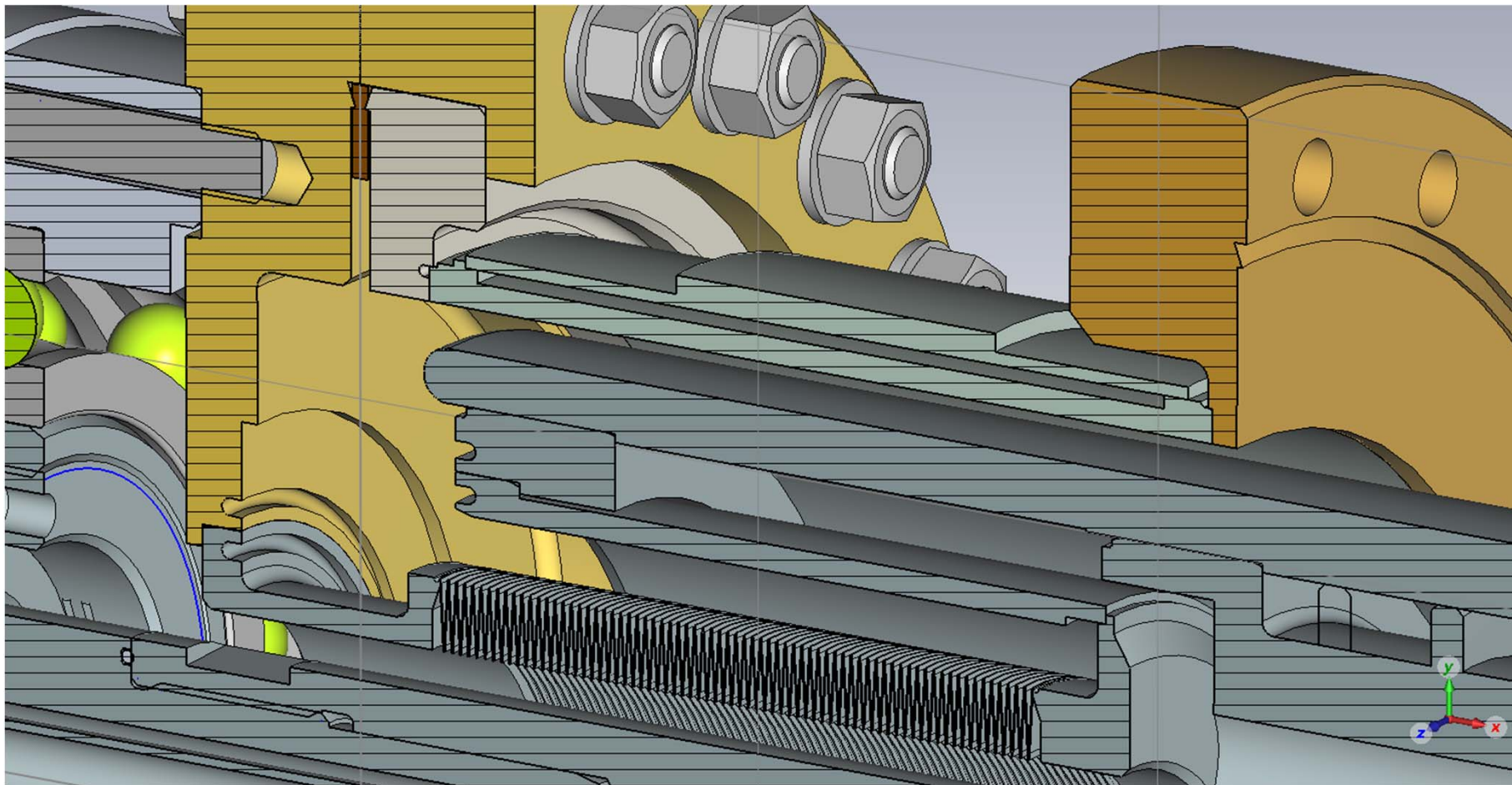
External Quality Factor



New Tuner für PETRA IV 500 MHz Cavity



New Tuner without Contact Springs



Tuner plunger defines the field limit for the cavities

- Calculate electric field strength in the tuner gap
- Calculate current on tuner bellow
- Simulate mode geometry for tuner test stand

Future work

- Calculation of shunt impedances and the beam enhancement factor
- High performance simulations (symmetric and distributed multiprocessing)

Thanks for your attention!

