Evaluating Designs for a PETRA IV Cavity

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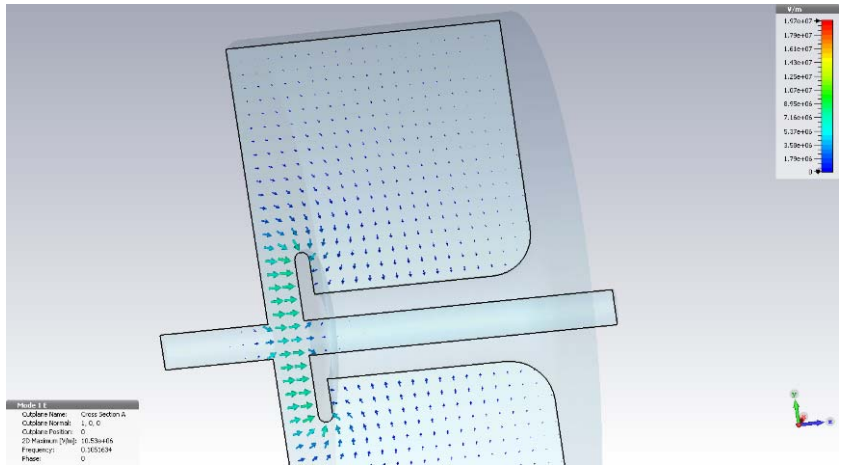
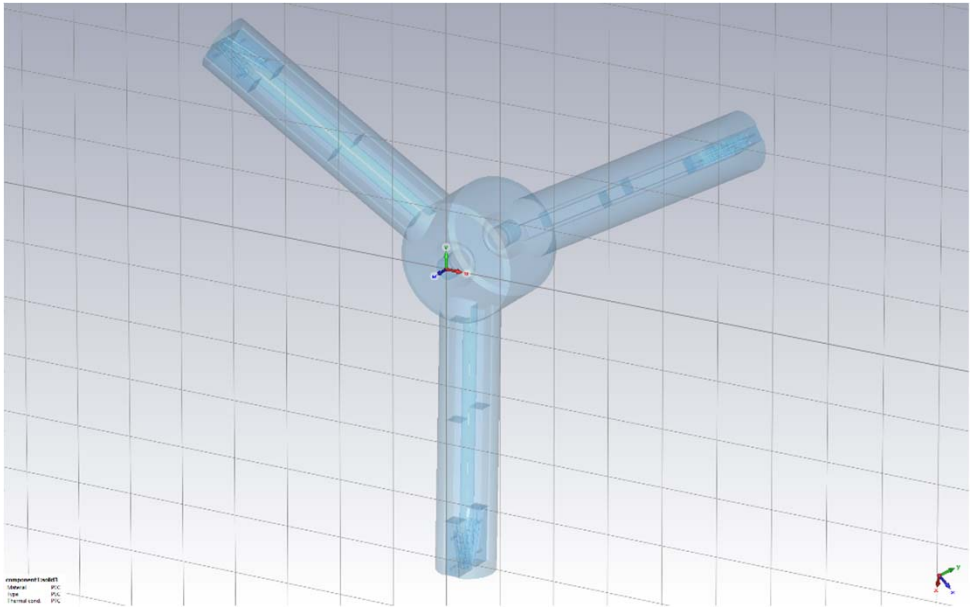
Outline

- Comparing two Cavity Types
- MAX IV Cavity:



- BESSY Cavity:



MAX IV Cavity (100 MHz)

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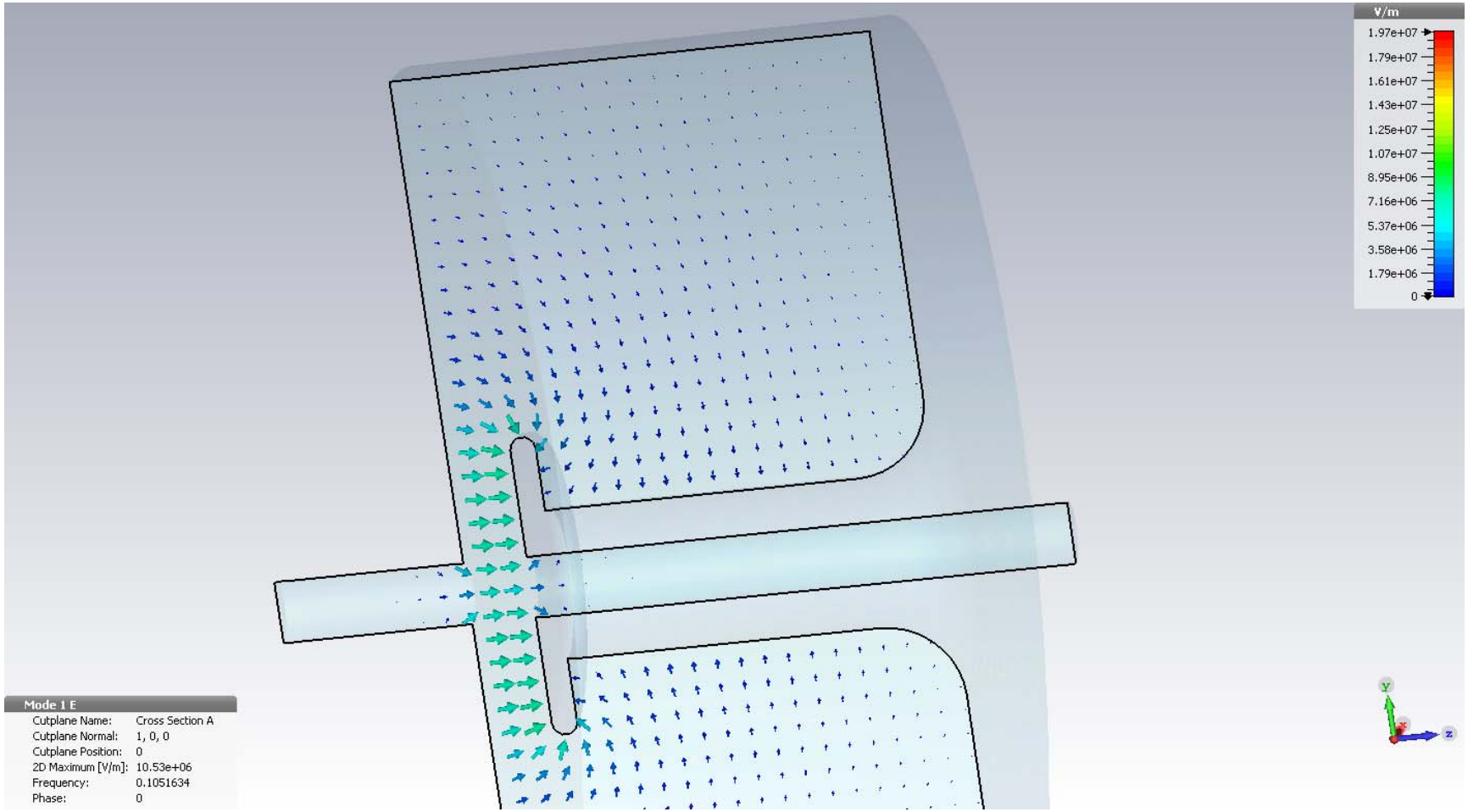
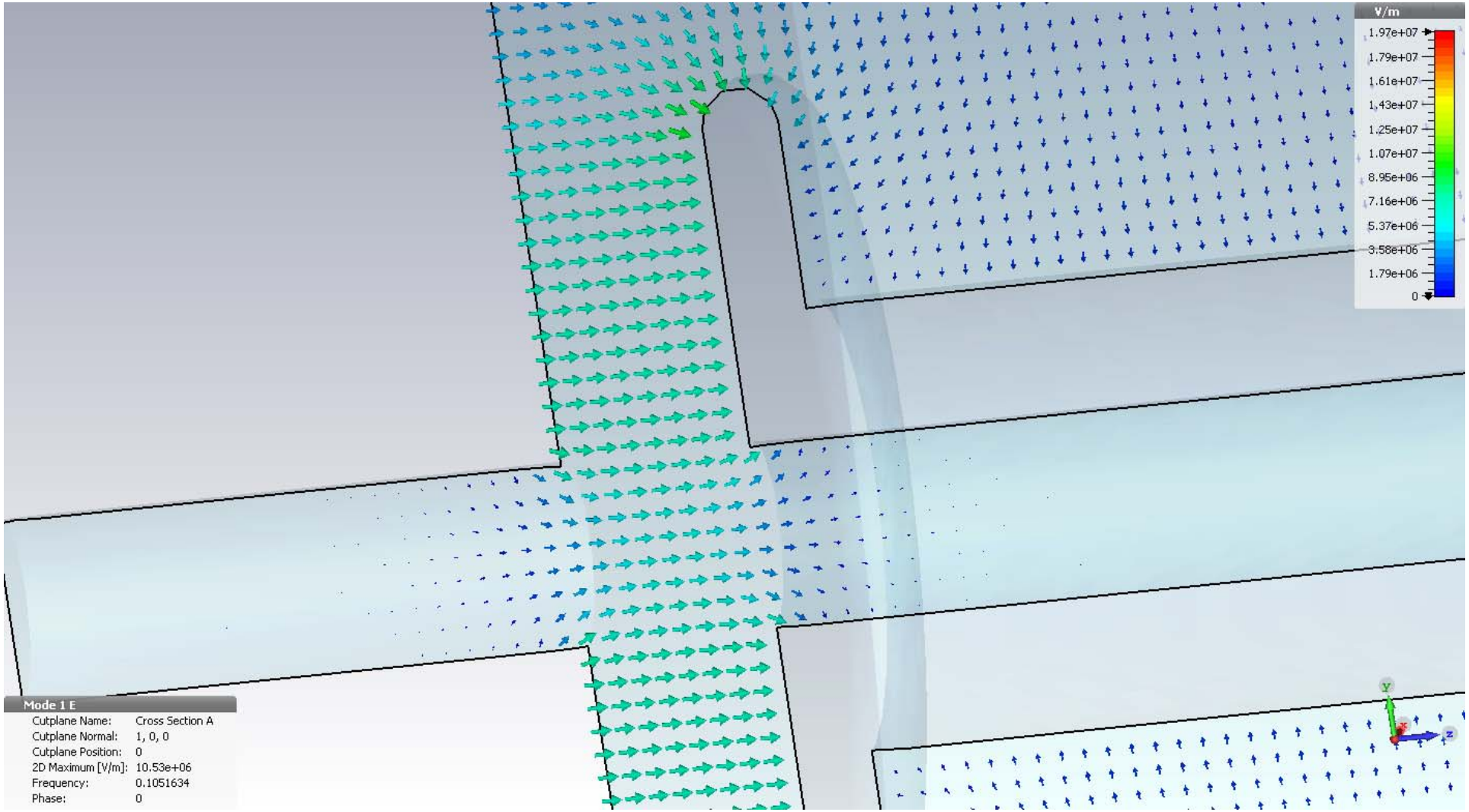
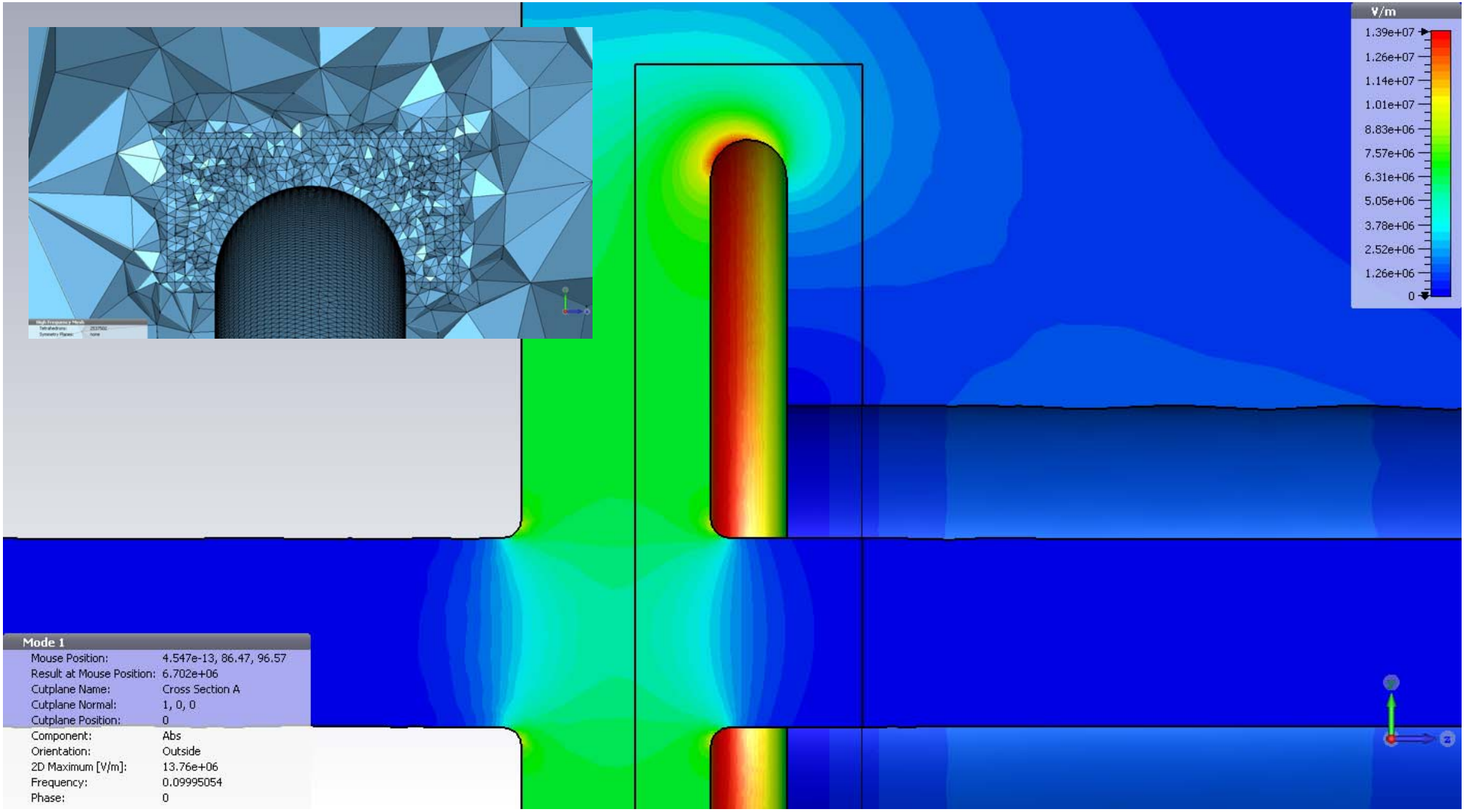
- Fundamental Mode



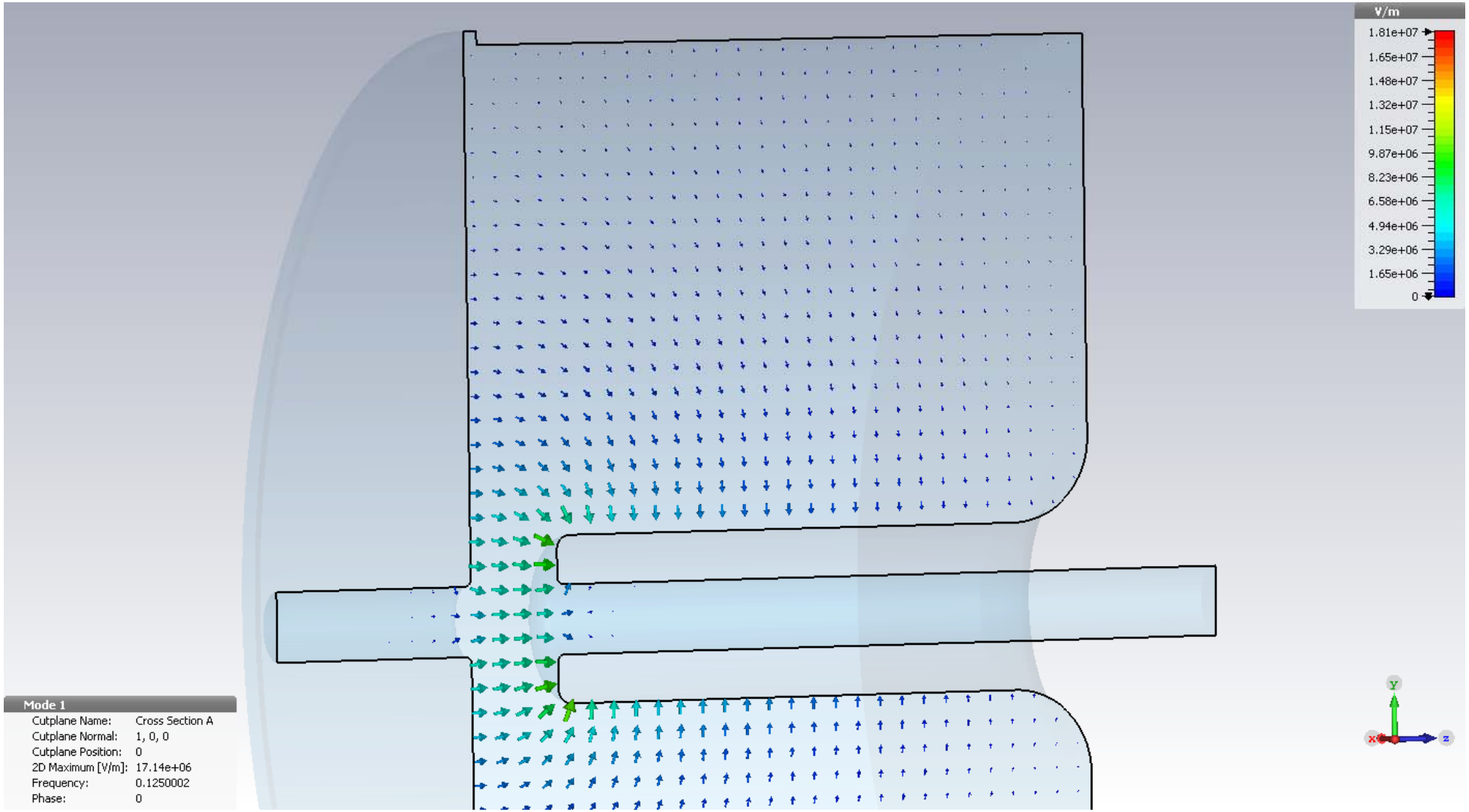
MAX IV Cavity (100 MHz)



MAX IV Cavity (100 MHz)



MAX IV Cavity (tuned to 125 MHz)



MAX IV Cavity (tuned to 125 MHz)

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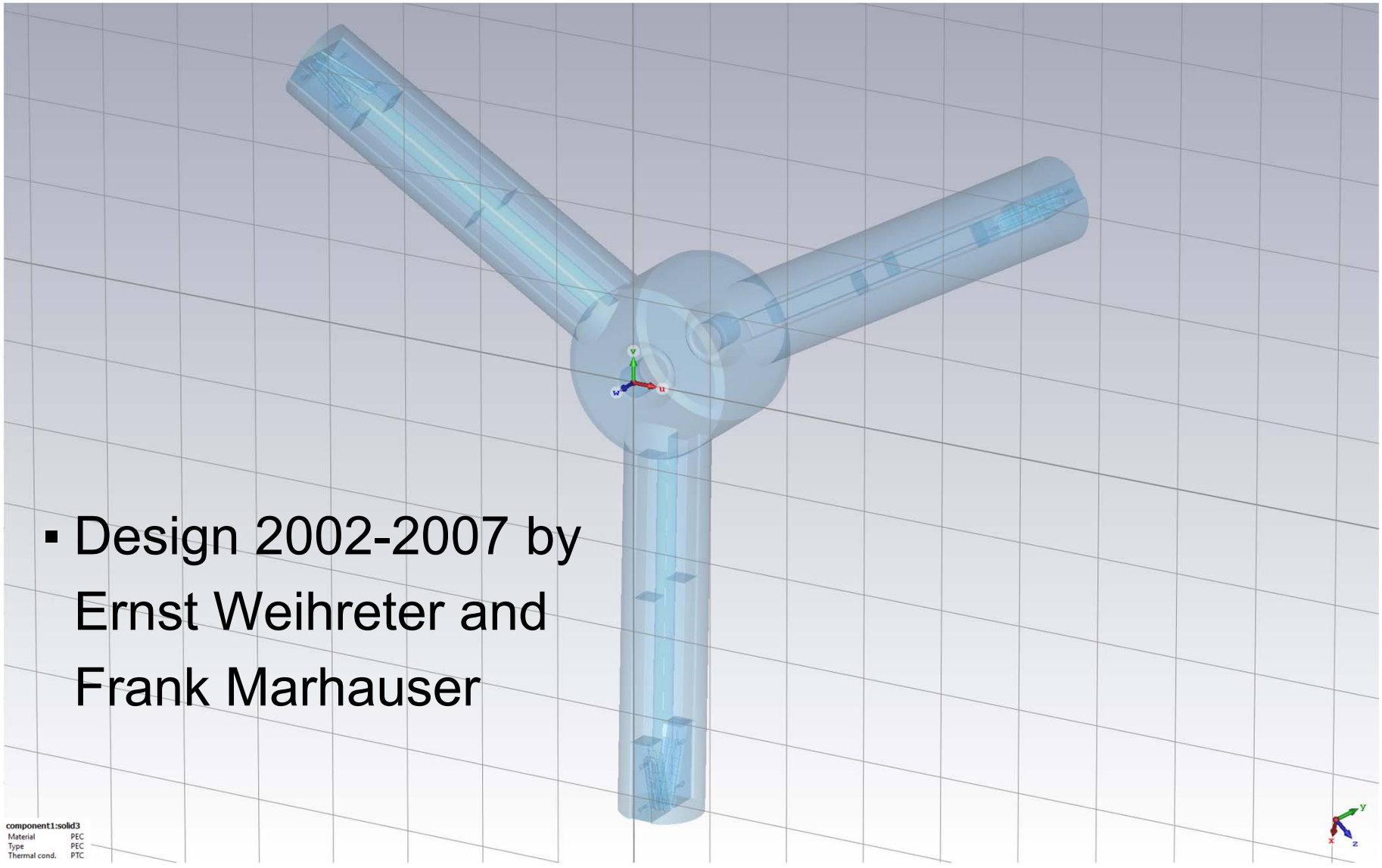
- Simpler Geometry without Capacitive Plate
- Reduced Complexity for Cooling Channels
- But Reduced Tuning Sensitivity by a Factor of 2.2
- Still Good Separation of Higher Order Modes

BESSY Cavity (500 MHz)



- Design 2002-2007 by Ernst Weihreter and Frank Marhauser

BESSY Cavity (500 MHz)

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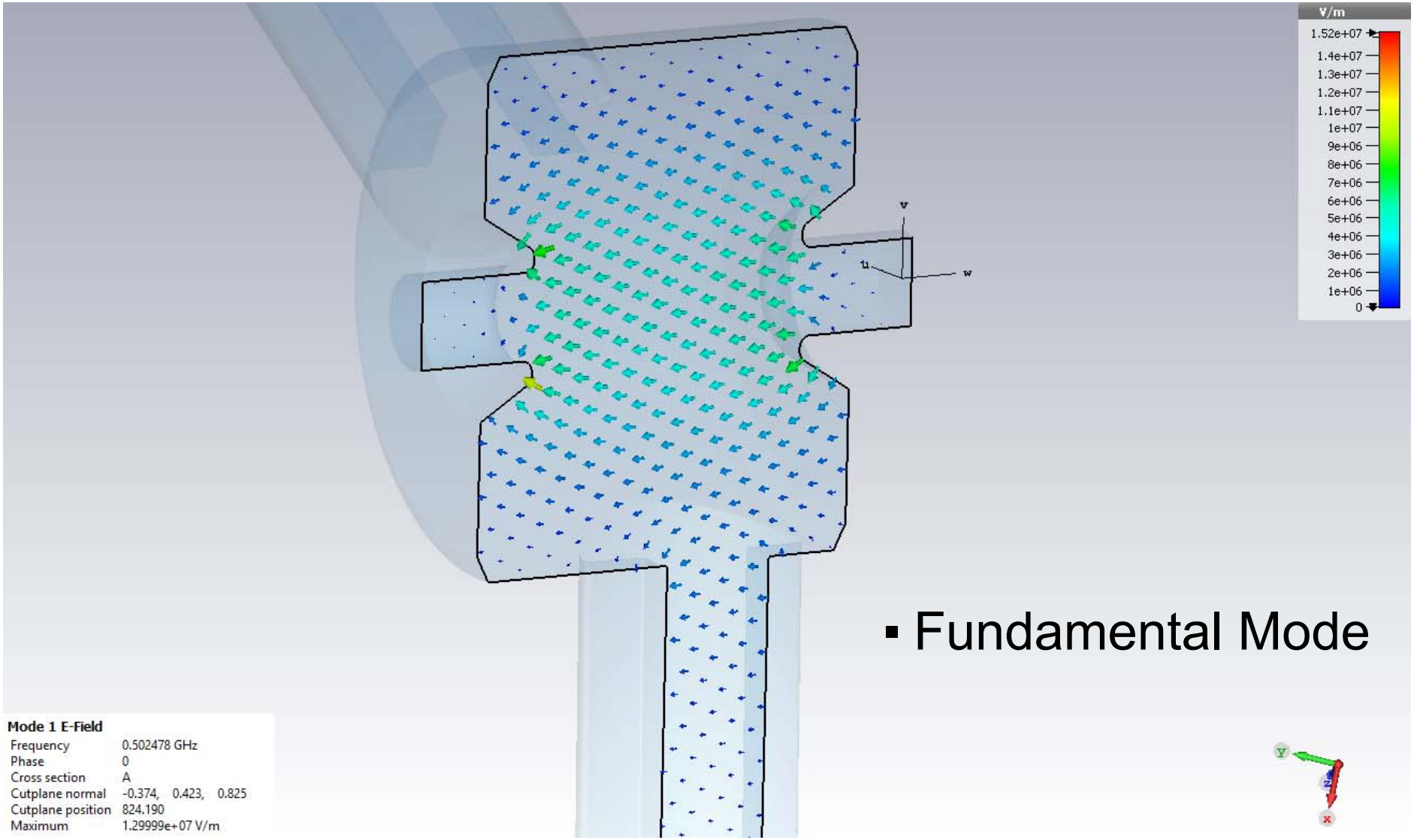
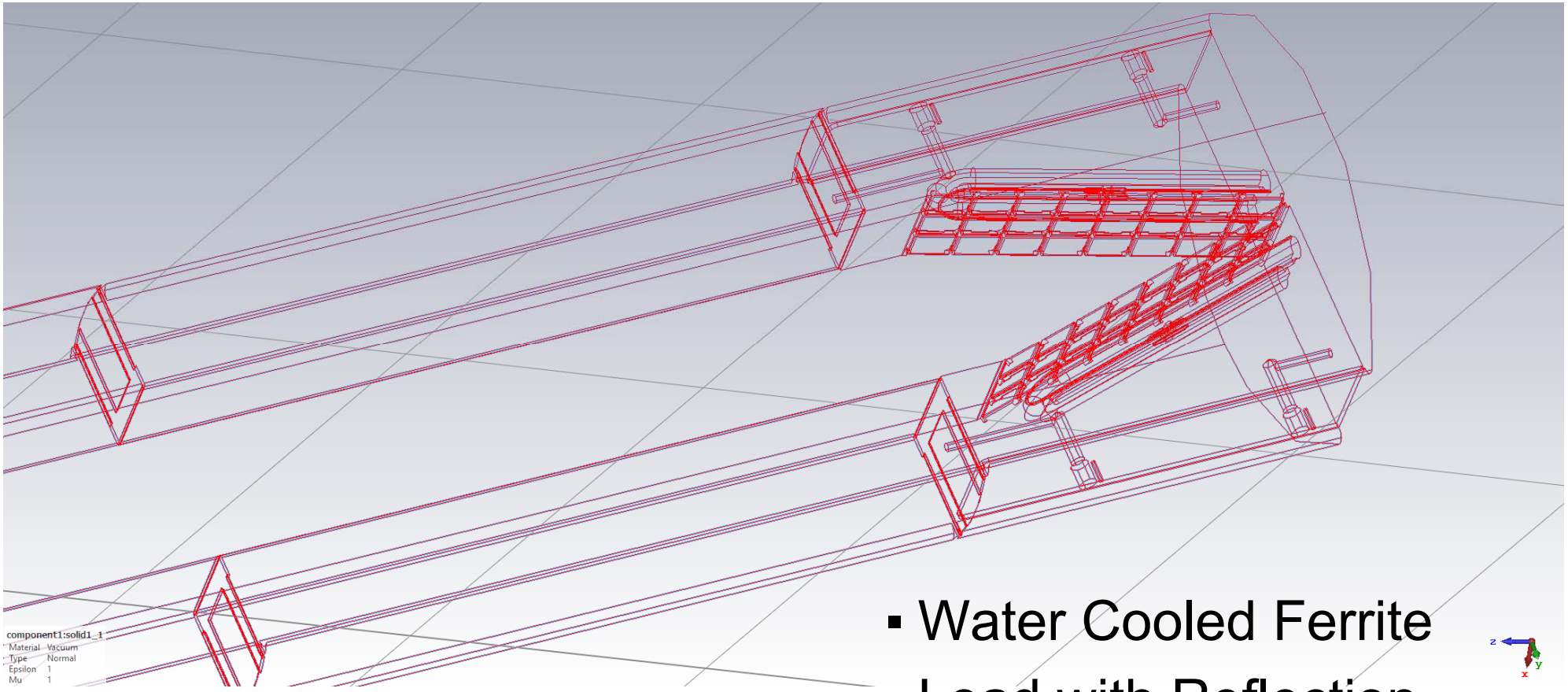


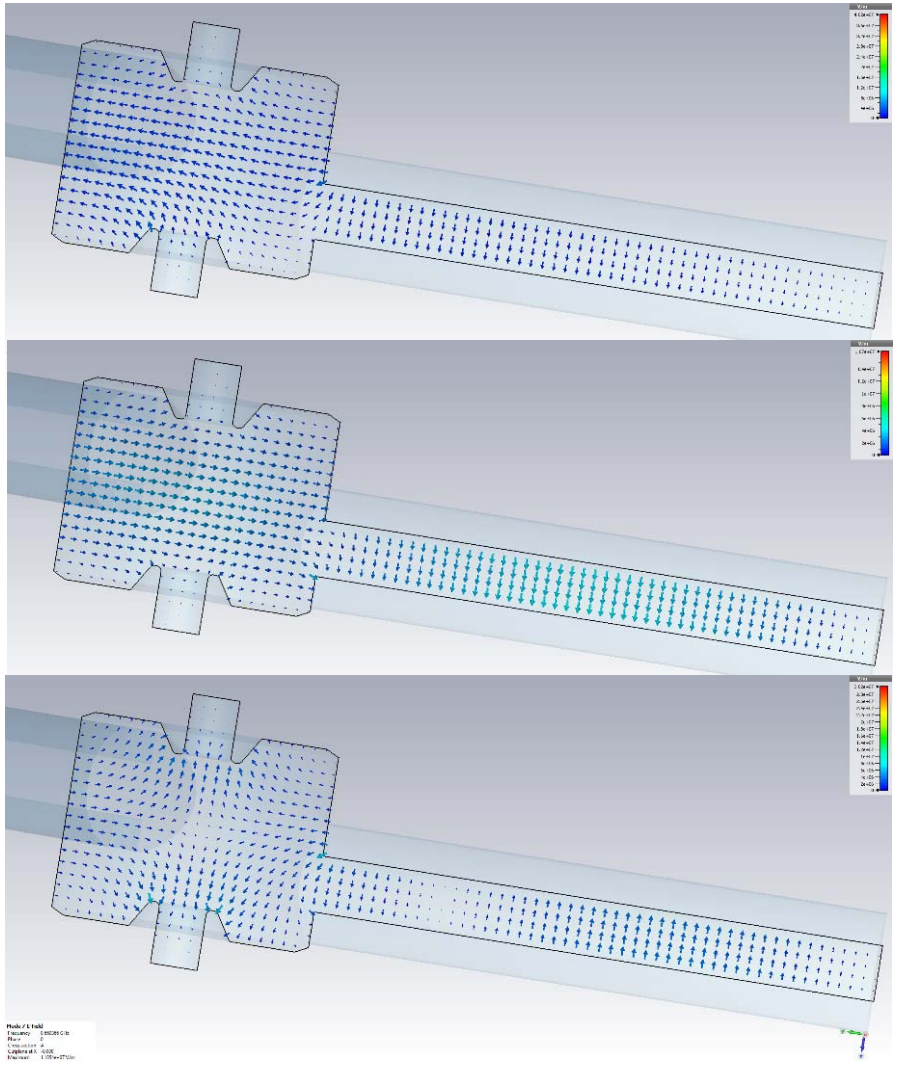
- Fundamental Mode

BESSY Cavity (500 MHz)



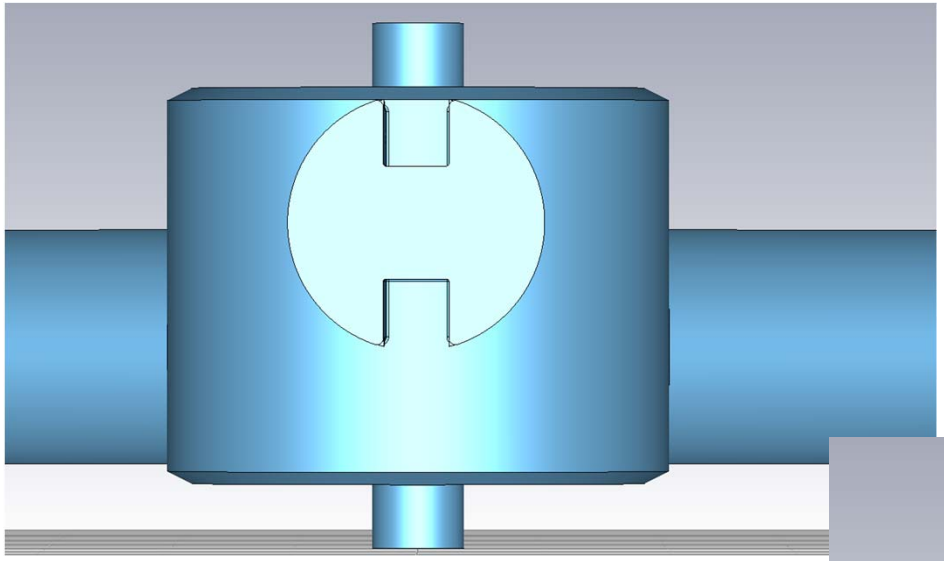
- Water Cooled Ferrite Load with Reflection below 20%

Real Eigenvalues

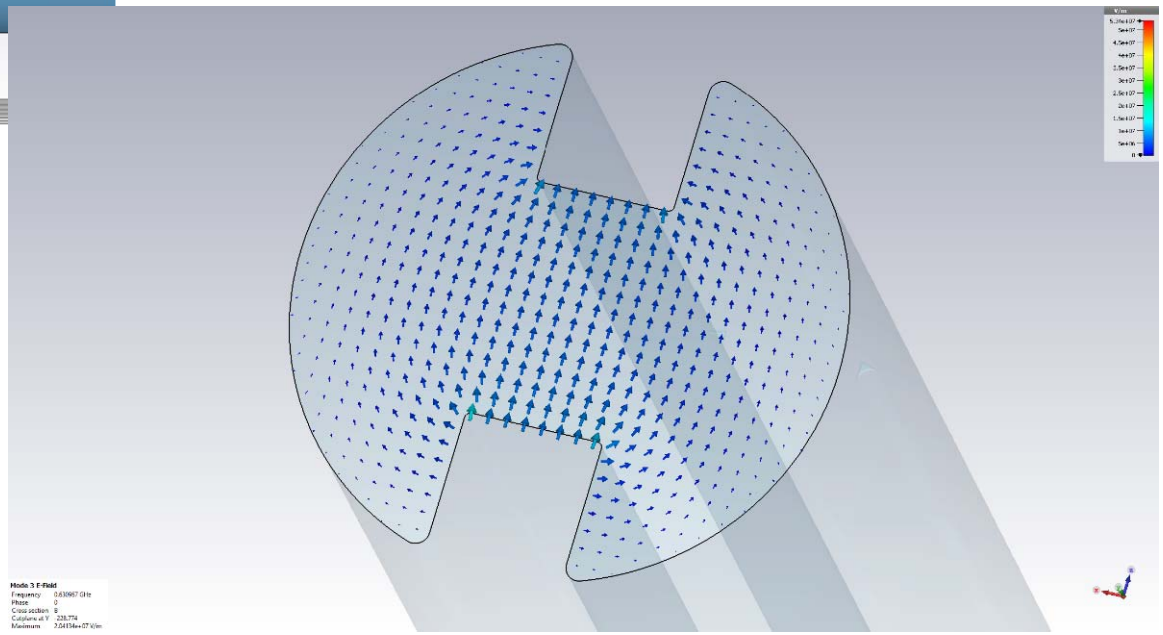


- Wave Guides Act as (1,2,3)-Quarter Wave Resonators
- Strong Coupling Leads to 4-fold Mode Splitting
- Complex Eigenmode Analysis Needed

BESSY Cavity (500 MHz)



- Dampers Replaced by Single Mode Wave Guide Port



Complex Eigenvalues

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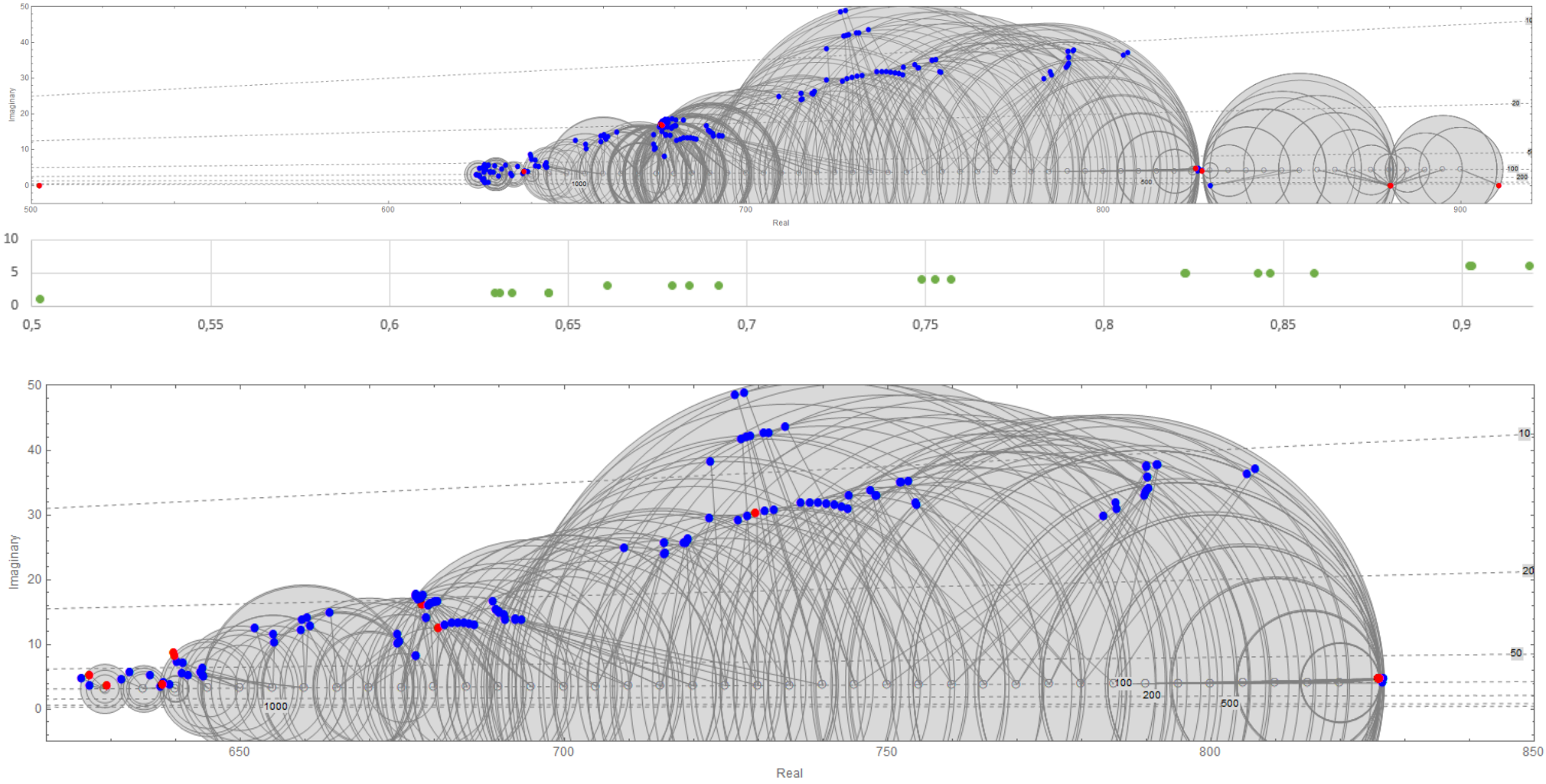
- Overview of First 371 Runs:



Quality Factors

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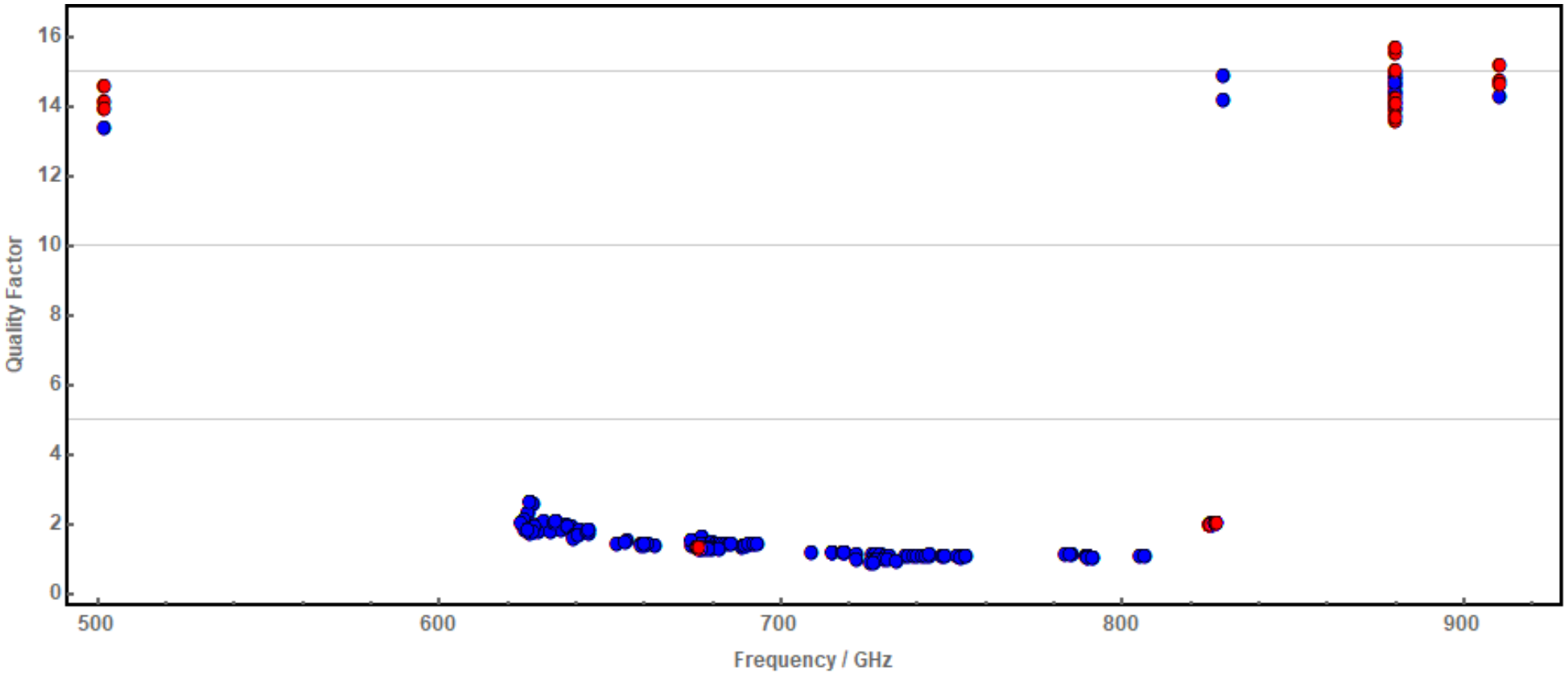
- Quality Factor of HOMs below 200 up to 800 MHz



Complex Eigenvalues

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- Slow Convergence For Low-Q Modes: