A 3D, k-Wave Based, Simulation Platform for FUS Treatment Planning, Optimization, and Device Design

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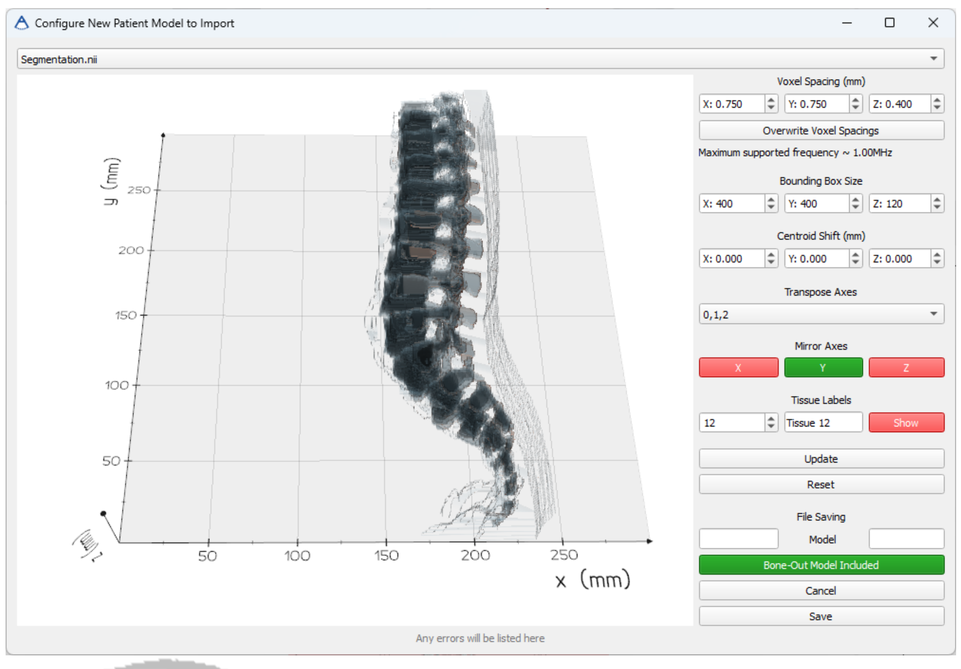
My Lab

Email

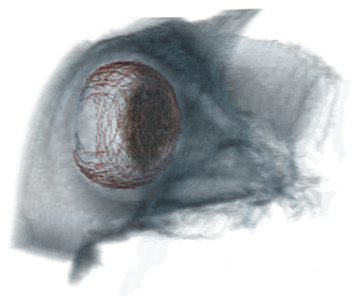
Patient Modeling

- Import segmented patient models directly from segmentations.



Skull

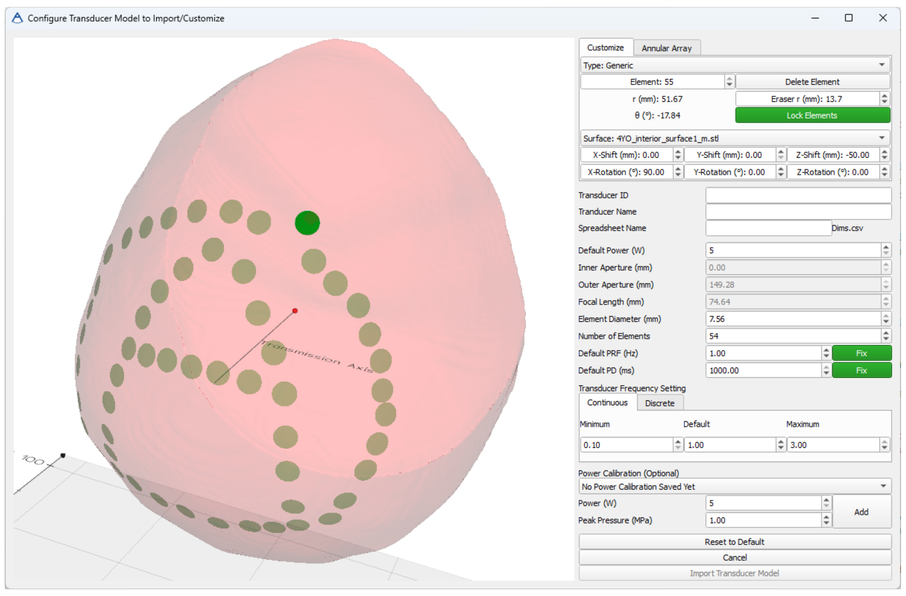
Eye



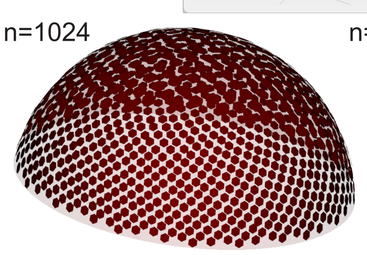
Spine

Transducer Design

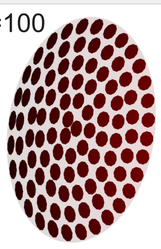
- Import bespoke systems, or customize new arrays (≤1024 elements).



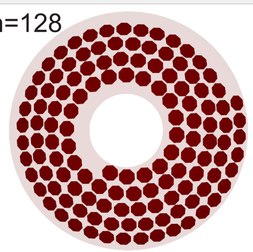
n=1024



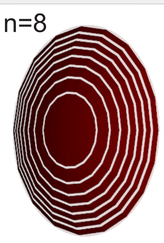
n=100



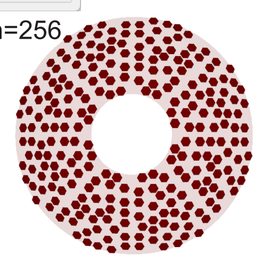
n=128



n=8

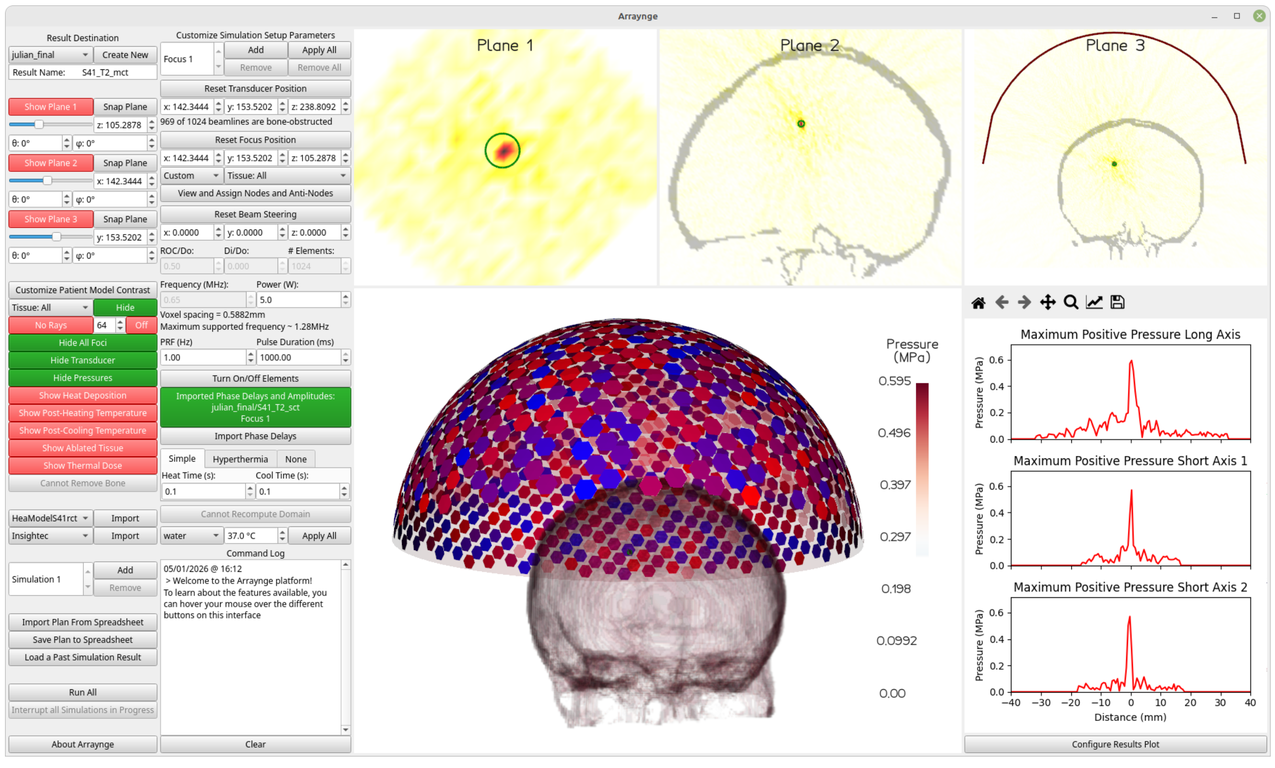


n=256



Central User Interface

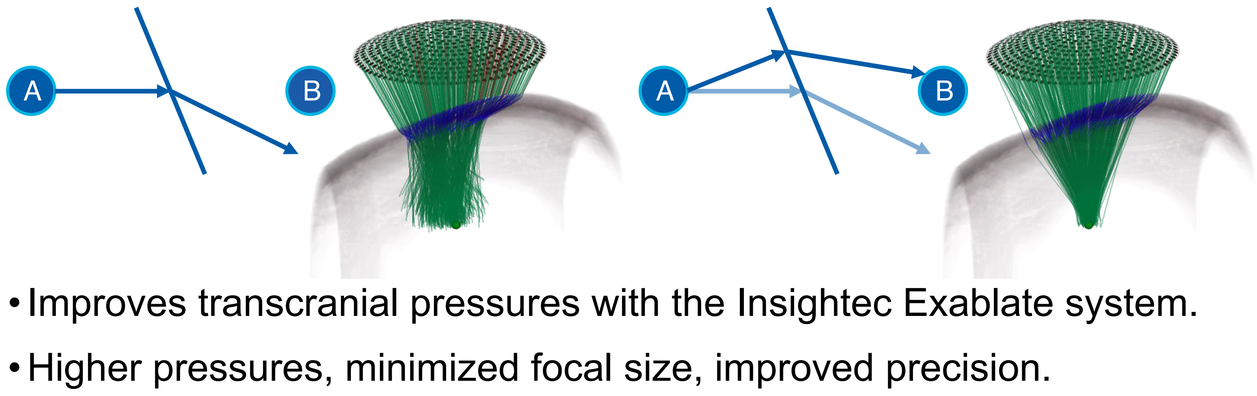
- Facilitates thermoacoustic treatment configurations and result analysis.
- Parallel k-Wave [1] simulations using computational clusters.



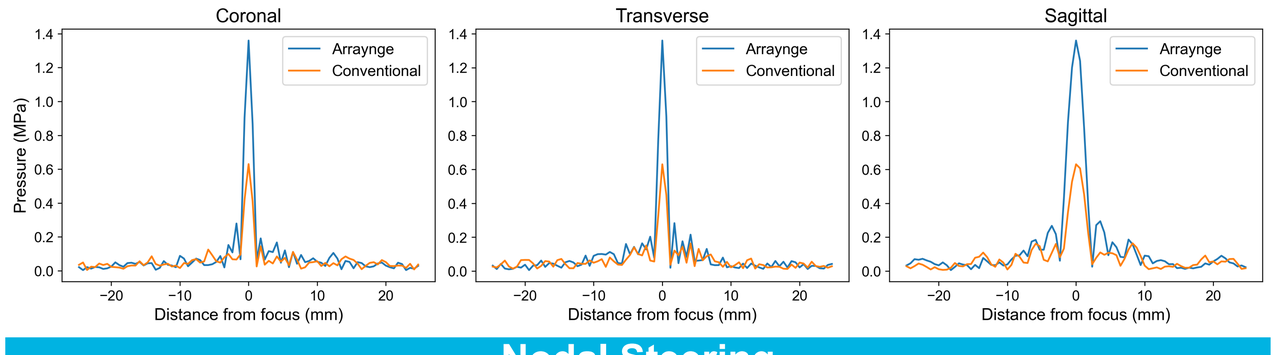
Treatment Optimization

In-House, Iterative Ray Tracing

- Useful for transcranial and transspinal simulations.
- Computed in 1 to 5 minutes for 256 to 1024 element arrays using a modest computer.

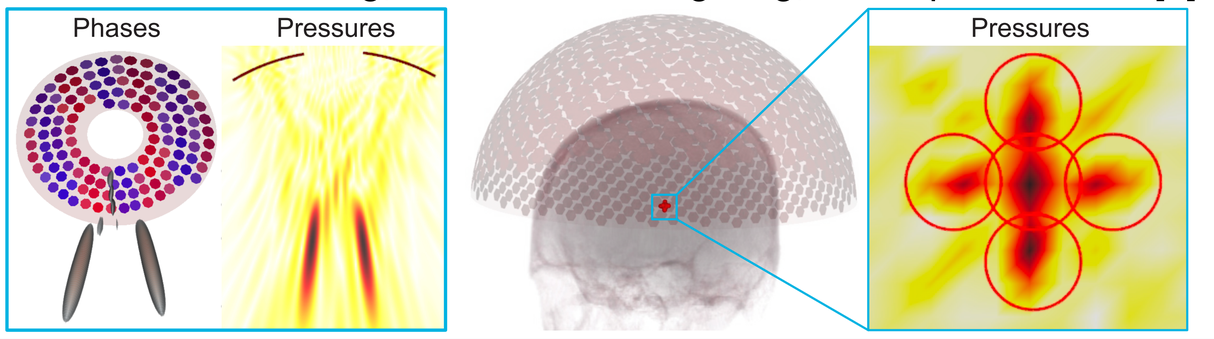


- Improves transcranial pressures with the Insightec Exablate system.
- Higher pressures, minimized focal size, improved precision.



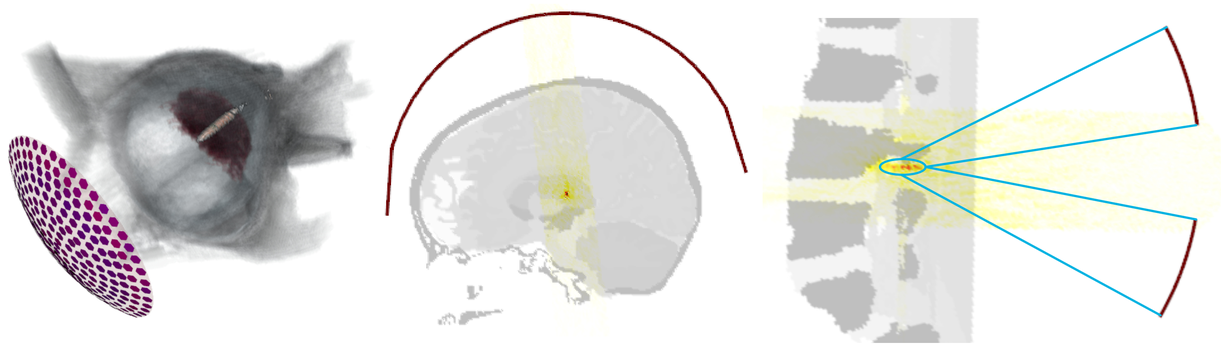
Nodal Steering

- Multiple high pressure and low pressure regions at once [2].
- Enables focal widening, simultaneous targeting, tissue preservation [3].



Simulations

- Successful eye [4], skull [5] and spine sonications.
- Runtimes between 10 minutes to 4 hours.



Summary

- Arraynge is a comprehensive tool for exploring potential FUS therapies.
- A useful tool for optimizing treatments and designing transducers.
- A user-friendly and code free platform for FUS simulation exploration.

Acknowledgements

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