

FSU  
WELCOME

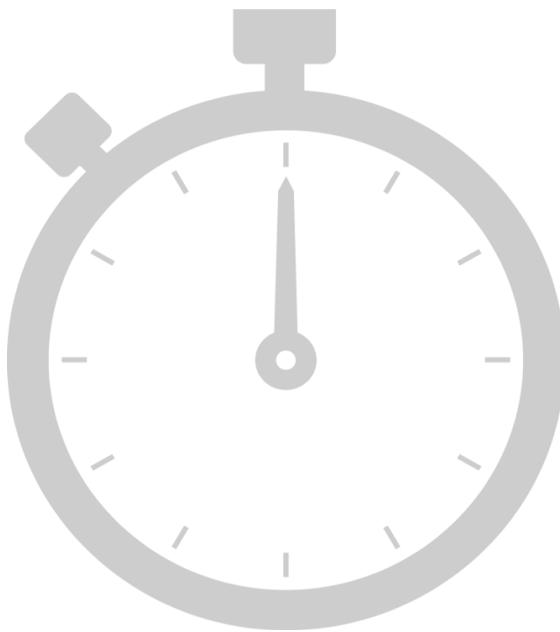
2024 Postdoctoral  
Fall Symposium

The Office of Postdoctoral Affairs  
The Graduate School | Florida State University

FSU

The Office of Postdoctoral Affairs

*Presents:*



# FIVE MINUTE RESEARCH

**POSTDOC COMPETITION**



Florida State University



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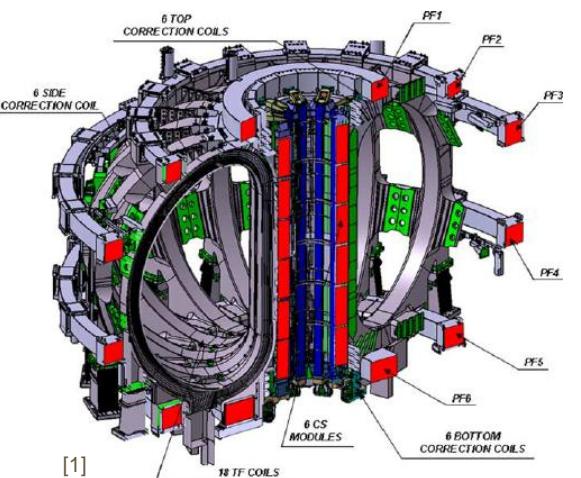
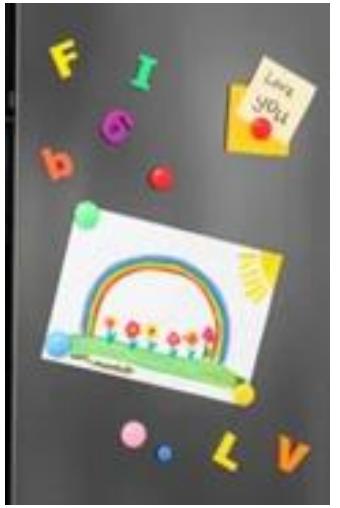


# Shannon Griffin

## National High-field Magnetic Laboratory

*Engineering Superconducting Magnets via Structural Simulations*

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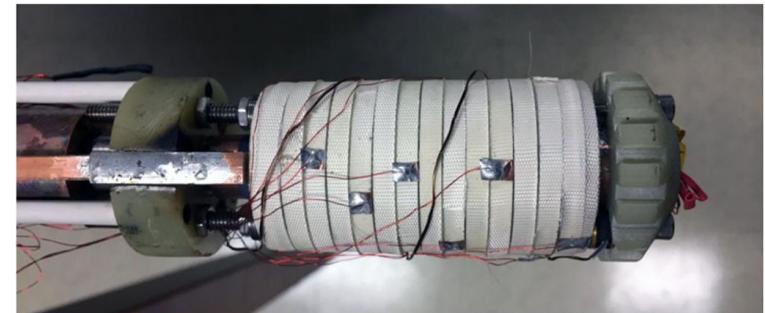
Earth  
0.00005 T

MRI  
1.5 T

Fridge  
Magnet  
0.001 T



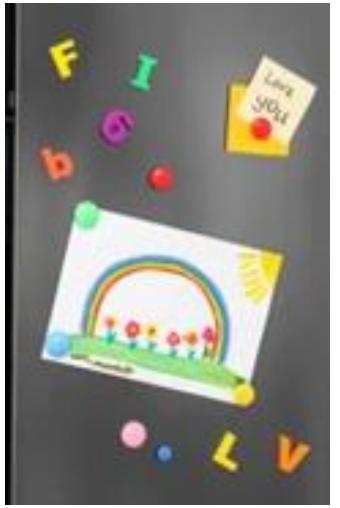
ITER Fusion  
Reactor  
13 T



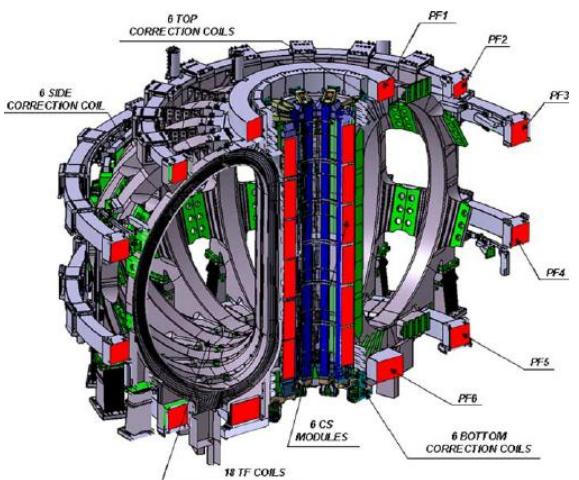
[2]

NHMFL  
45.5 T





Permanent  
magnet



Earth  
0.00005 T

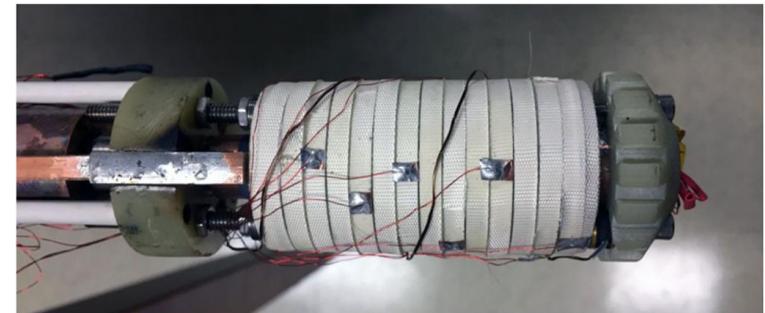
MRI  
1.5 T

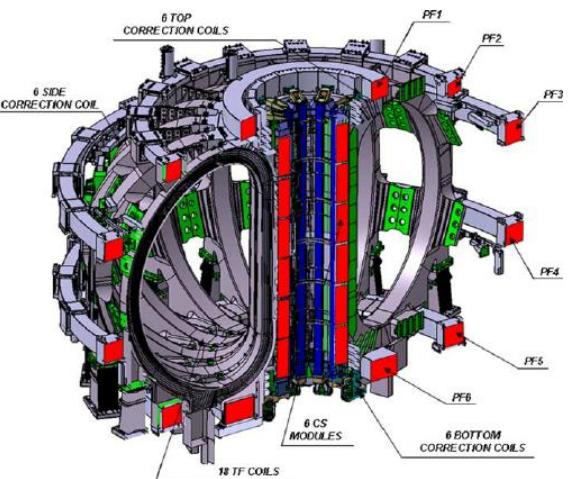
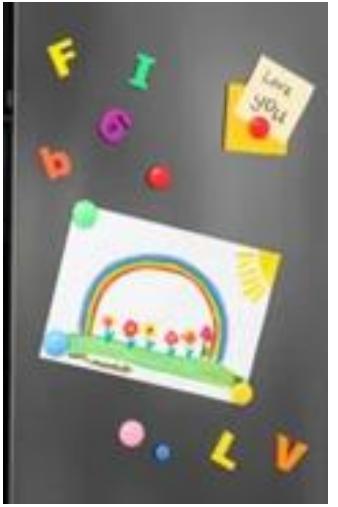
Fridge  
Magnet  
0.001 T



ITER Fusion  
Reactor  
13 T

NHMFL  
45.5 T





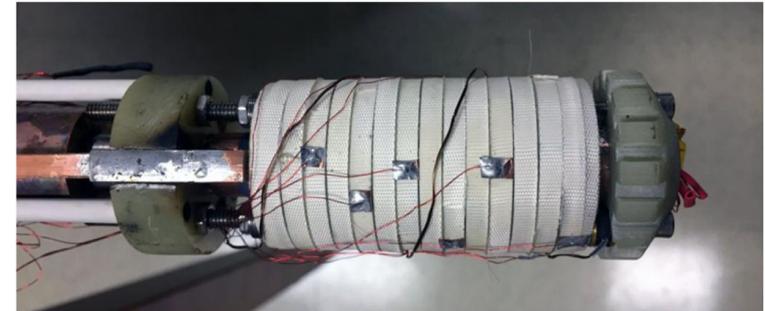
Earth  
0.00005 T

MRI  
1.5 T

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Magnet  
0.001 T



ITER Fusion  
Reactor  
13 T

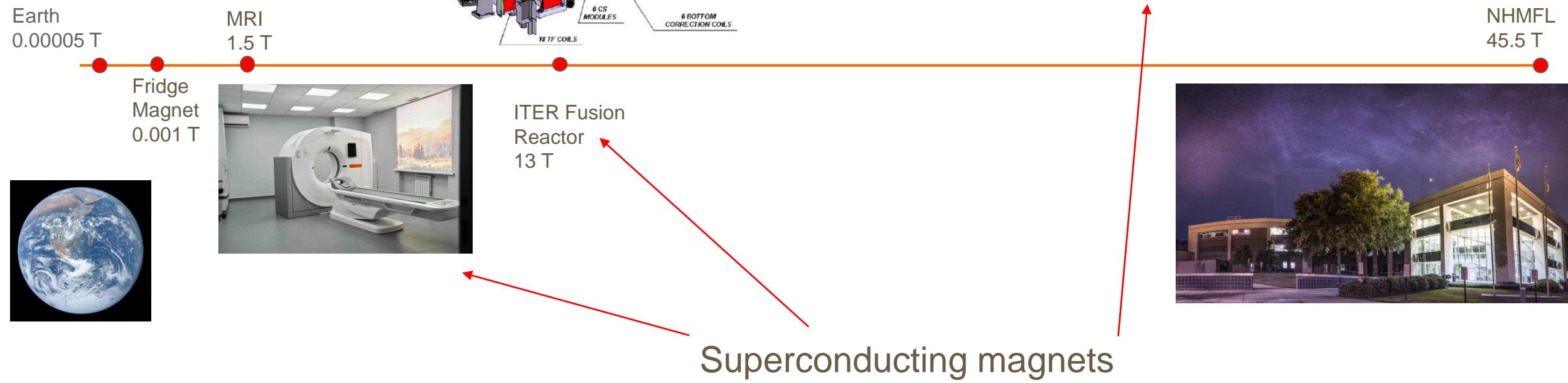
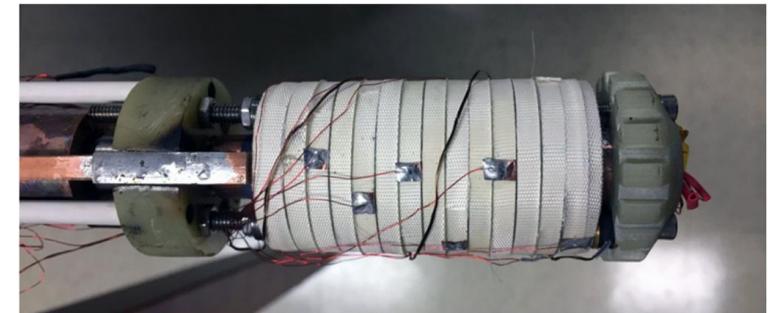
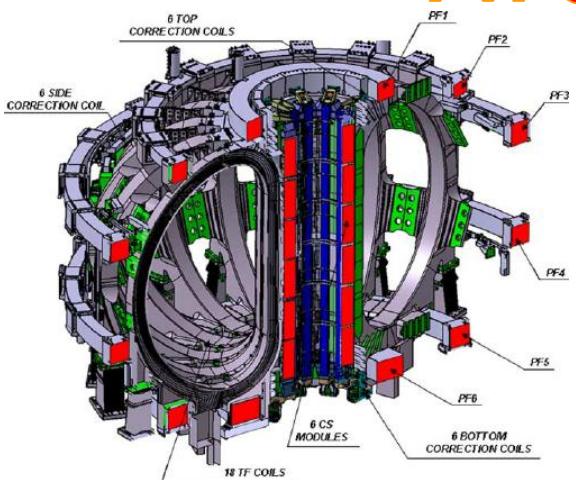


NHMFL  
45.5 T



Superconducting magnets

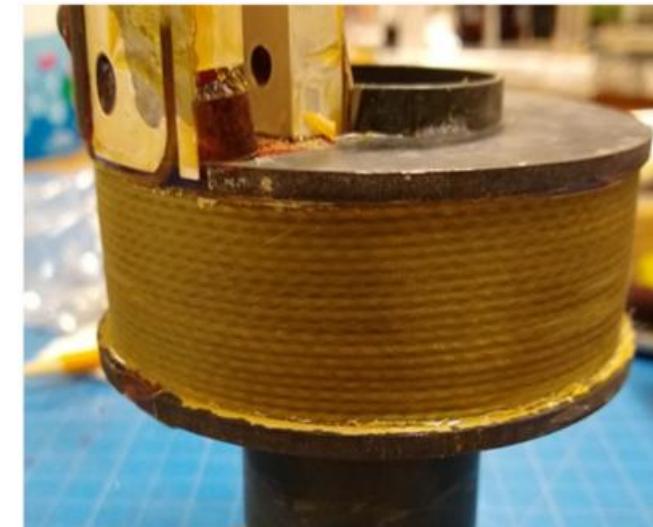
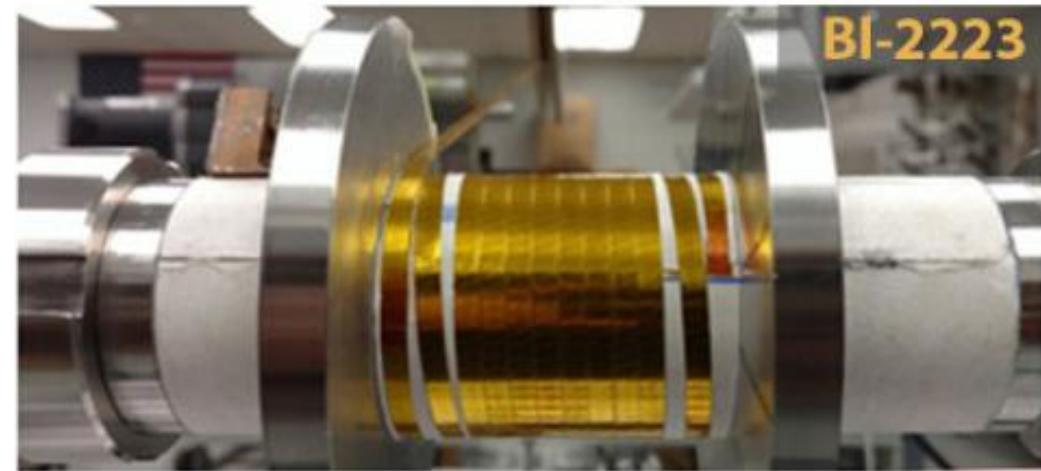
# HIGH MAGNETIC FIELDS!!



# 40T Project

- 40 Tesla Superconducting magnet
- Beneficial to various fields of physics research
  - Extended run time
  - Lower noise levels

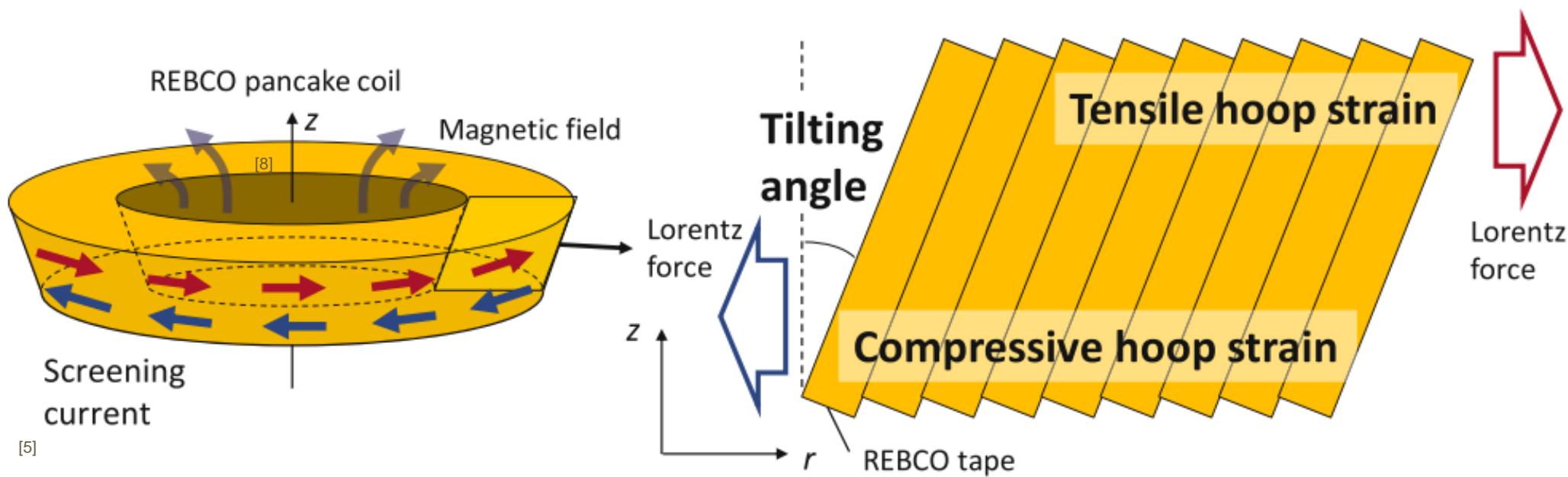
Superconducting tape<sup>[3]</sup>



Test coil<sup>[4]</sup>

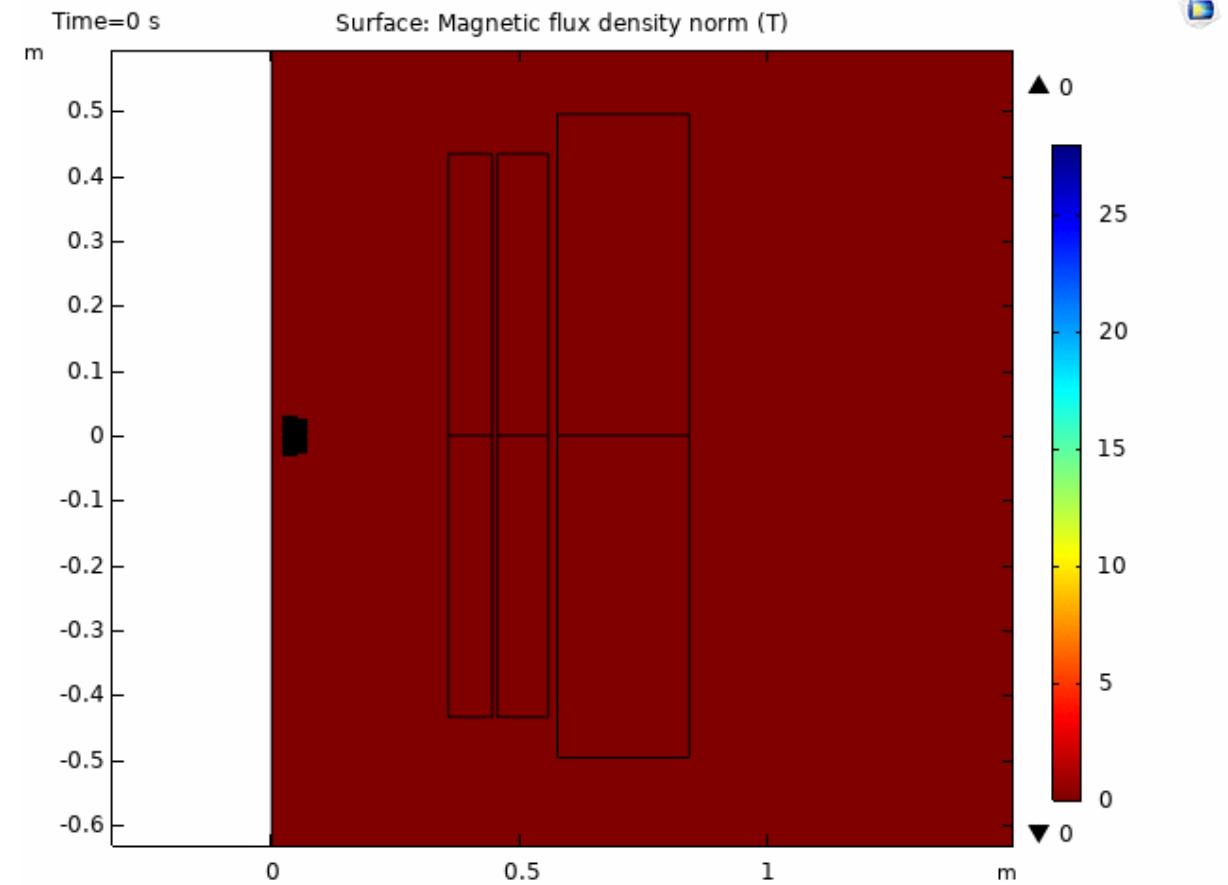
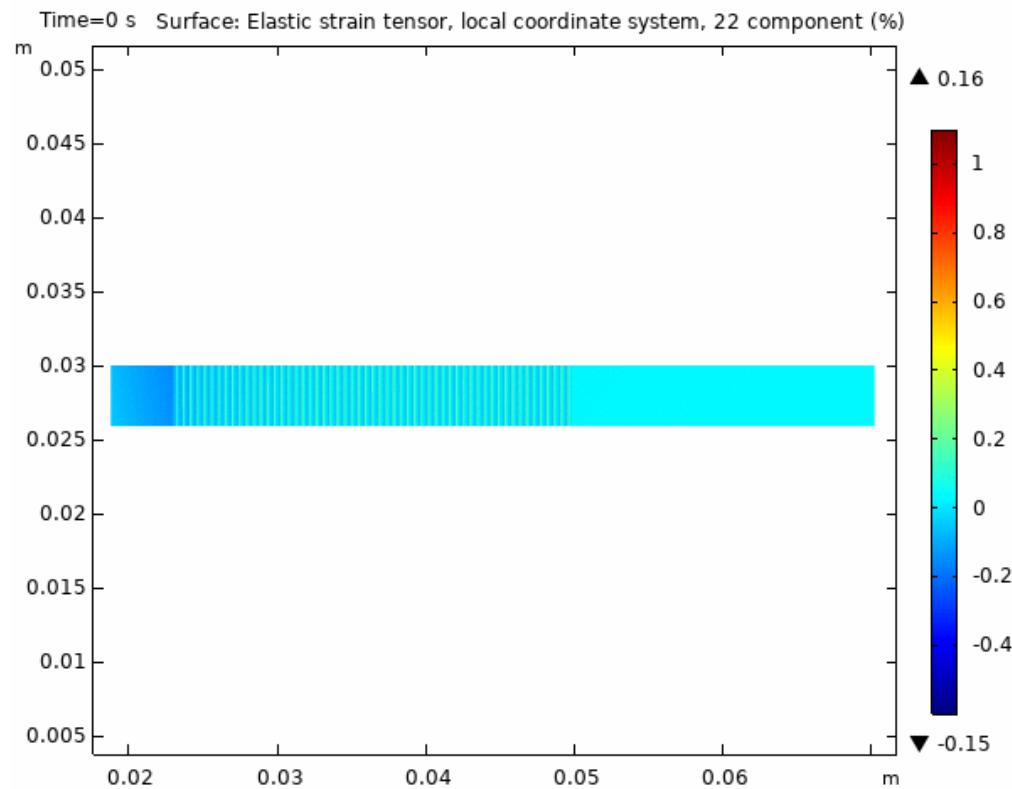
# Strain in Superconductors

- Disks composed of tapes.
- High magnetic fields → Lorentz forces
- Forces → deformations of the superconducting tapes!



# Numerical Analysis

- Instrumental in the design process of superconducting magnets.



Test coil modeled using FLOSSS application

# Implications to advancements in superconducting magnet design

Medical



[6]

Research



[7]

Clean Energy



[8]

**THANK YOU!**

# Image citations

[1][https://www.researchgate.net/figure/Layout-of-the-CC-system-of-ITER-the-TF-coils-have-been-removed-from-the-view-for\\_fig2\\_233921924](https://www.researchgate.net/figure/Layout-of-the-CC-system-of-ITER-the-TF-coils-have-been-removed-from-the-view-for_fig2_233921924)

[2]<https://nationalmaglab.org/news-events/news/lbc-project-world-record-magnetic-field>

[3] <https://nationalmaglab.org/magnet-development/magnet-projects/40-tesla-superconducting-magnet/>

[4] Bai, H., Abraimov, D. V., Boebinger, G. S., Bird, M. D., Cooley, L. D., Dixon, I. R., Kim, K. L., Larbalestier, D. C., Marshall, W. S., Trociewitz, U. P., & Weijers, H. W. (2020). The 40 T superconducting magnet project at the National High Magnetic Field Laboratory. *IEEE Transactions on Applied Superconductivity*, 30(4), 1–5. <https://doi.org/10.1109/tasc.2020.2969642>

[5] Suetomi, Y., Xu, P., Bosque, E. S., Gavrilin, A. V., Markiewicz, W. D., Bai, H., & Dixon, I. R. (2024). Screening current induced stress/strain analysis of High Field Rebco coils with co-winding or over-banding reinforcement. *IEEE Transactions on Applied Superconductivity*, 34(5), 1–6. <https://doi.org/10.1109/tasc.2023.3342762>

[6] <https://www.euronews.com/health/2021/07/23/potentially-life-saving-study-could-cut-labelling-times-for-mri-scans-from-years-to-minute>

[7][https://en.wikipedia.org/wiki/Particle\\_accelerator](https://en.wikipedia.org/wiki/Particle_accelerator)

[8] <https://psatellite.com/pss-advances-in-sc-motors-for-aircraft/>

# Acknowledgements



**Jing Wang**  
Dean and Professor  
PhD, MPH, RN, FAAN



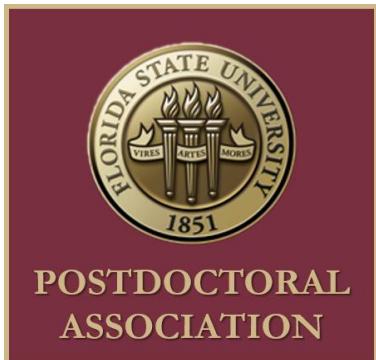
**Hye Jin Park**  
Associate Professor  
PhD, RN



**Hongyu Miao**  
Professor, Director of Brain  
Science & Symptom  
Management Center  
PhD



**Dan Song**  
Postdoctoral Scholar  
RN, PhD



POSTDOCTORAL  
ASSOCIATION



**Chengdong Li**  
Data Scientist



**Buna Bhandari**  
Postdoctoral Scholar  
MPH, PhD



**Setor Kofi Sorkpor**  
Assistant Professor  
PhD, MPH, MSN, RN



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Postdoctoral Scholar  
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AWARDS & RECEPTION

Please join us for refreshments  
and award presentations

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PROGRAM END

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