

Compact Superconducting High-Field Magnets for NMR Applications

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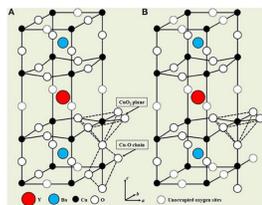
Aim Benchtop, fully High Temperature Superconductor-based NMR magnet with the goal to achieve 10 T and high homogeneity

1 Material selection

T_c of 92-95 K

Higher H_{irr}

Higher J_c

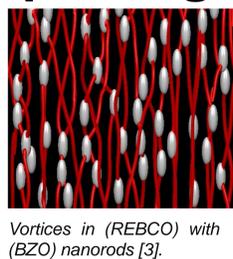
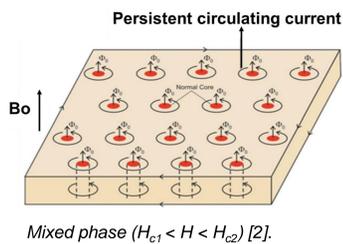


Cryogen-free

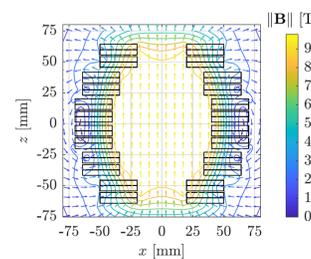
Thermal Stability

Lower Power

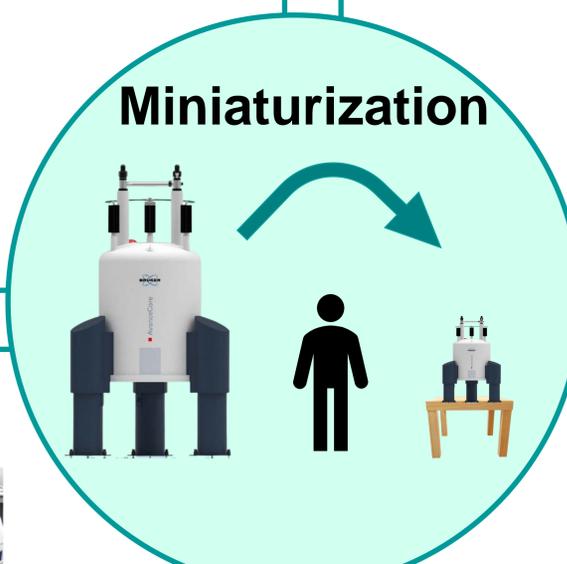
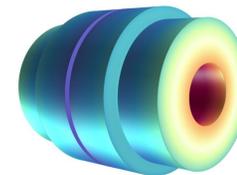
2 Vortex pinning



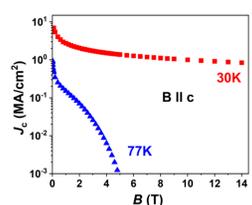
Magnet



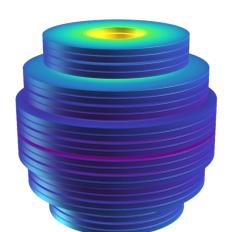
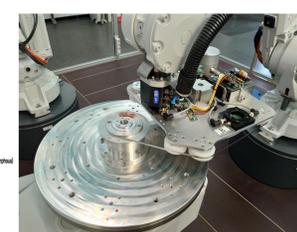
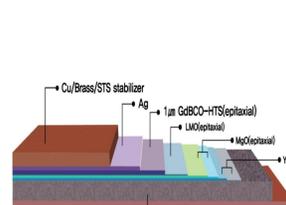
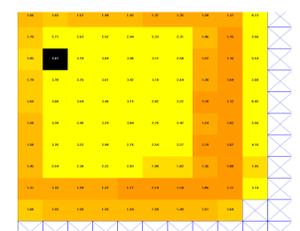
- Fully HTS benchtop NMR magnet
- 9.4 T at 30 K for high sensitivity
- Cryogen-free cooling
- Portable



5 Future Outlook



4 Current Status



Challenges

Spatial Homogeneity (ppb), Temporal stability, Cryogen-free cooling, Compact size

References

- [1] Jha AK and Matsumoto K Front. Phys. 7:82 (2019).
- [2] R. G. Sharma, Superconductivity Basics and Applications to Magnets, Springer, (2021).
- [3] Sadvovskyy, I.A., et.al., Toward Superconducting Critical Current by Design. Adv. Mater., 28: 4593-4600, (2016).