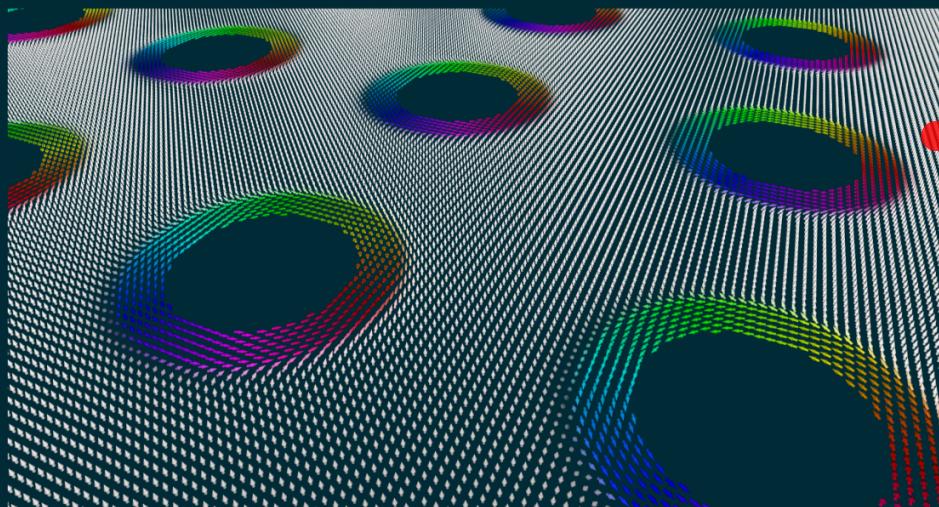


# ANTIDOT LATTICE WITH PERPENDICULAR MAGNETIC ANISOTROPY: DYNAMICS BETWEEN EDGE MODES AND BULK MODES



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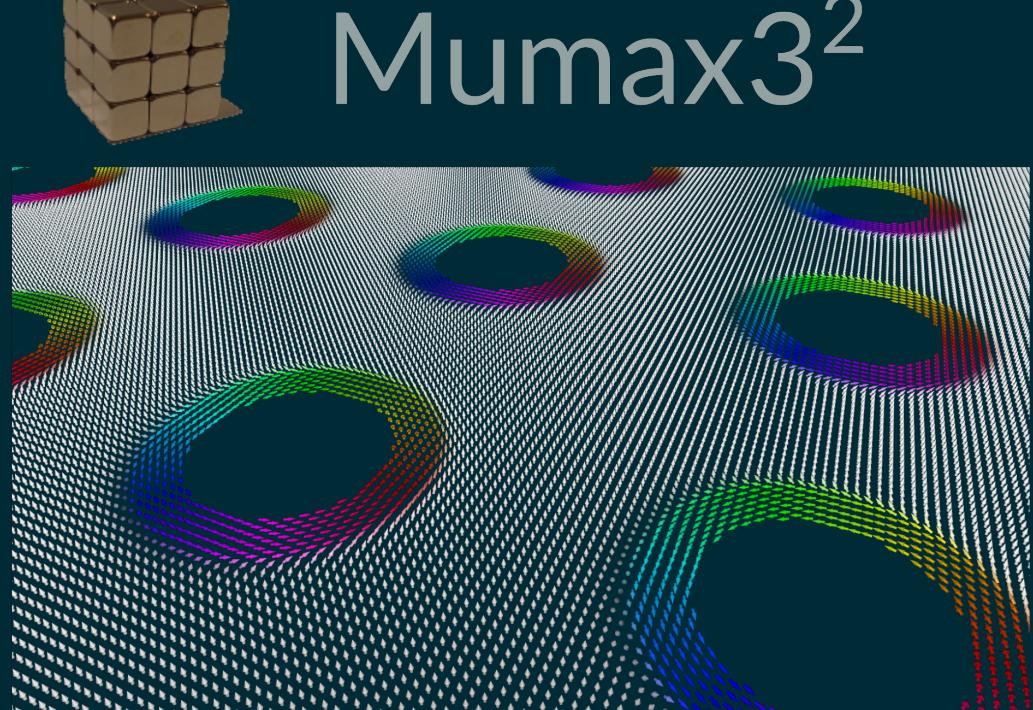
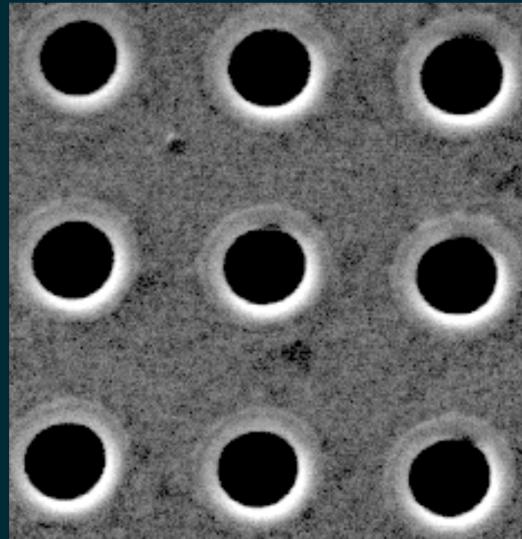
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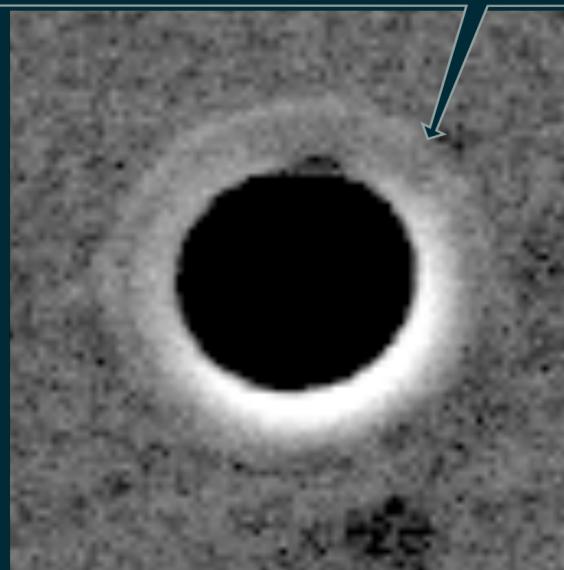
<ISQI> INSTITUTE OF SPINTRONICS  
AND QUANTUM INFORMATION

# Experiments<sup>1</sup>



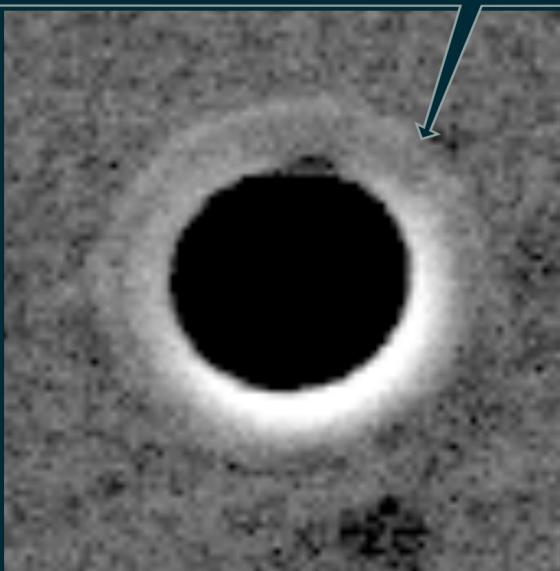
# Mumax3<sup>2</sup>

Defects in the rim around the  
antidot from the focused ion beam



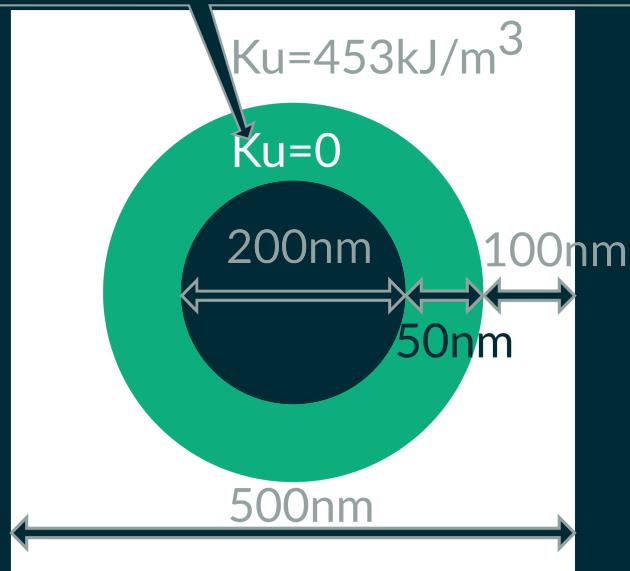
Scanning electron microscopy

Defects in the rim around the antidot from the focused ion beam

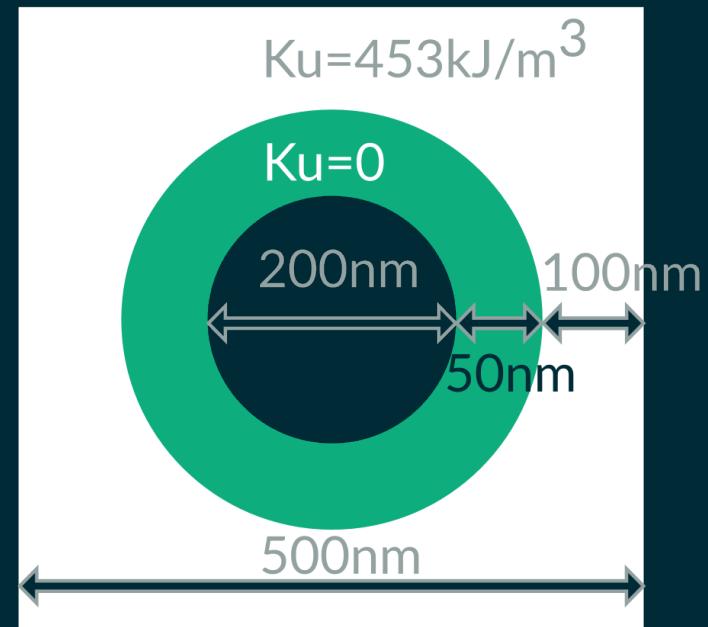
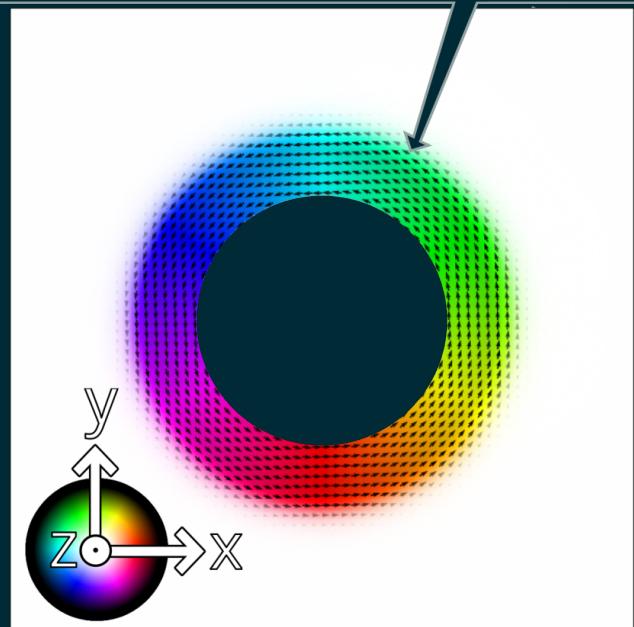


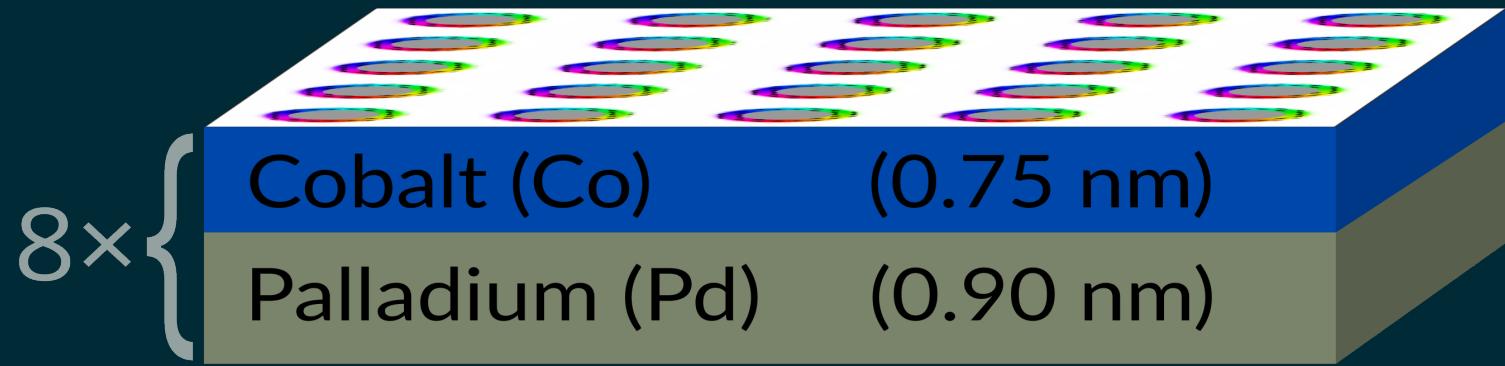
Scanning electron microscopy

Fitted in simulations by adding destroyed anisotropy in the rim around the antidot

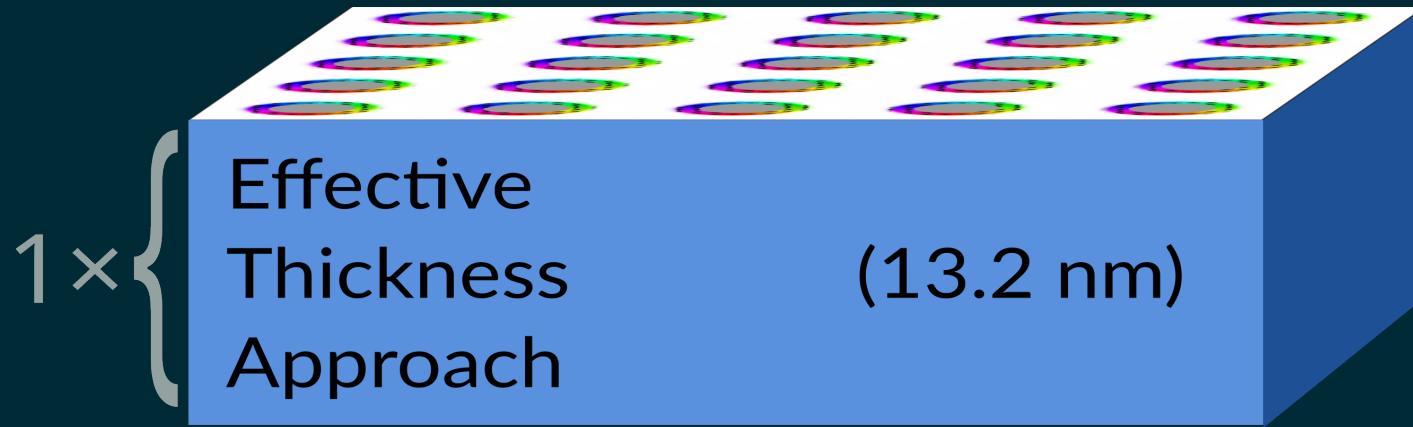
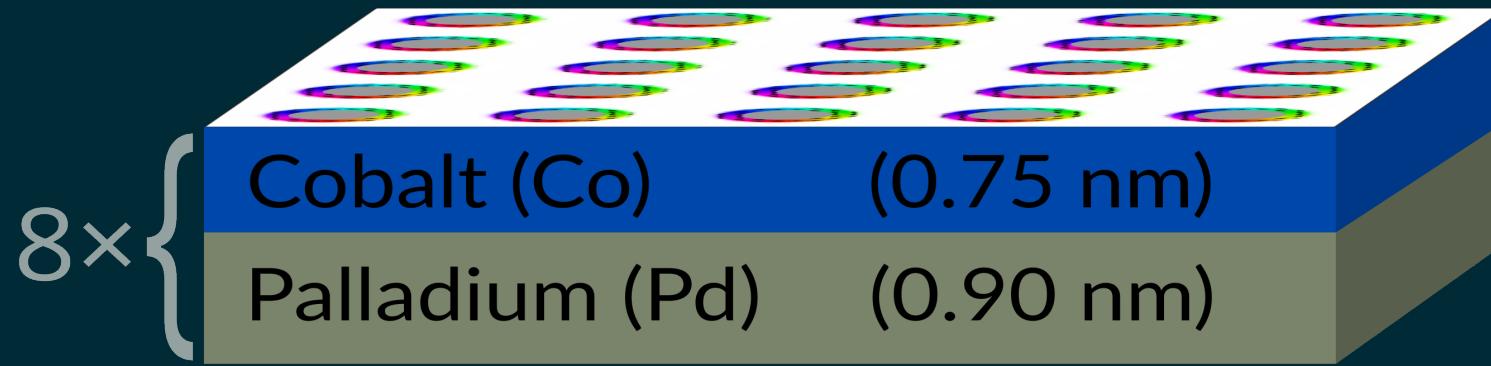


We chose to only consider a counter-clockwise vortex-like state in the rim

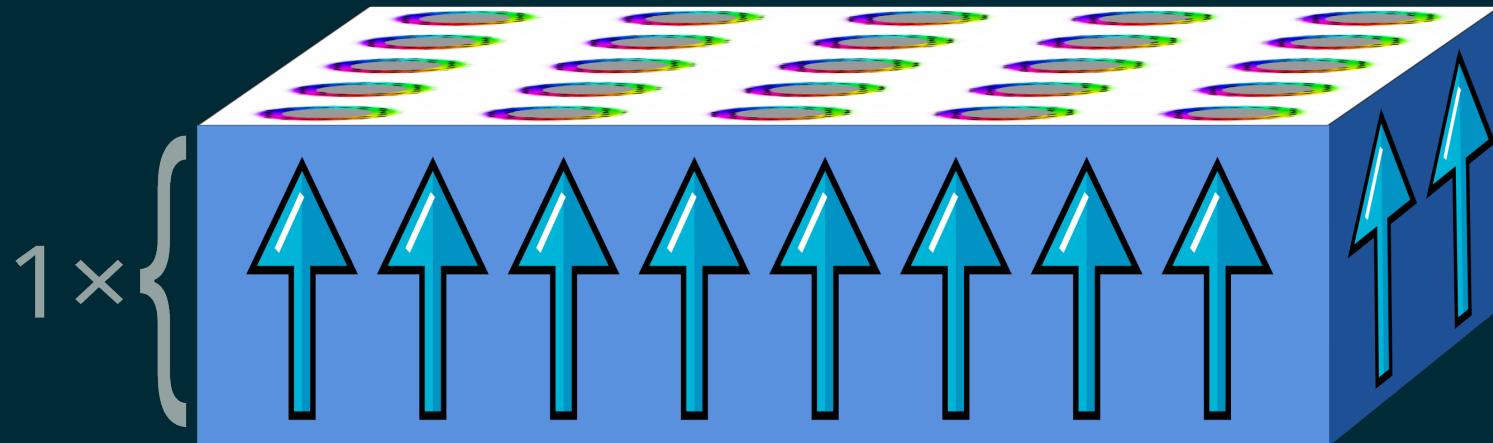












Magnetization Saturation = 810 kA/m

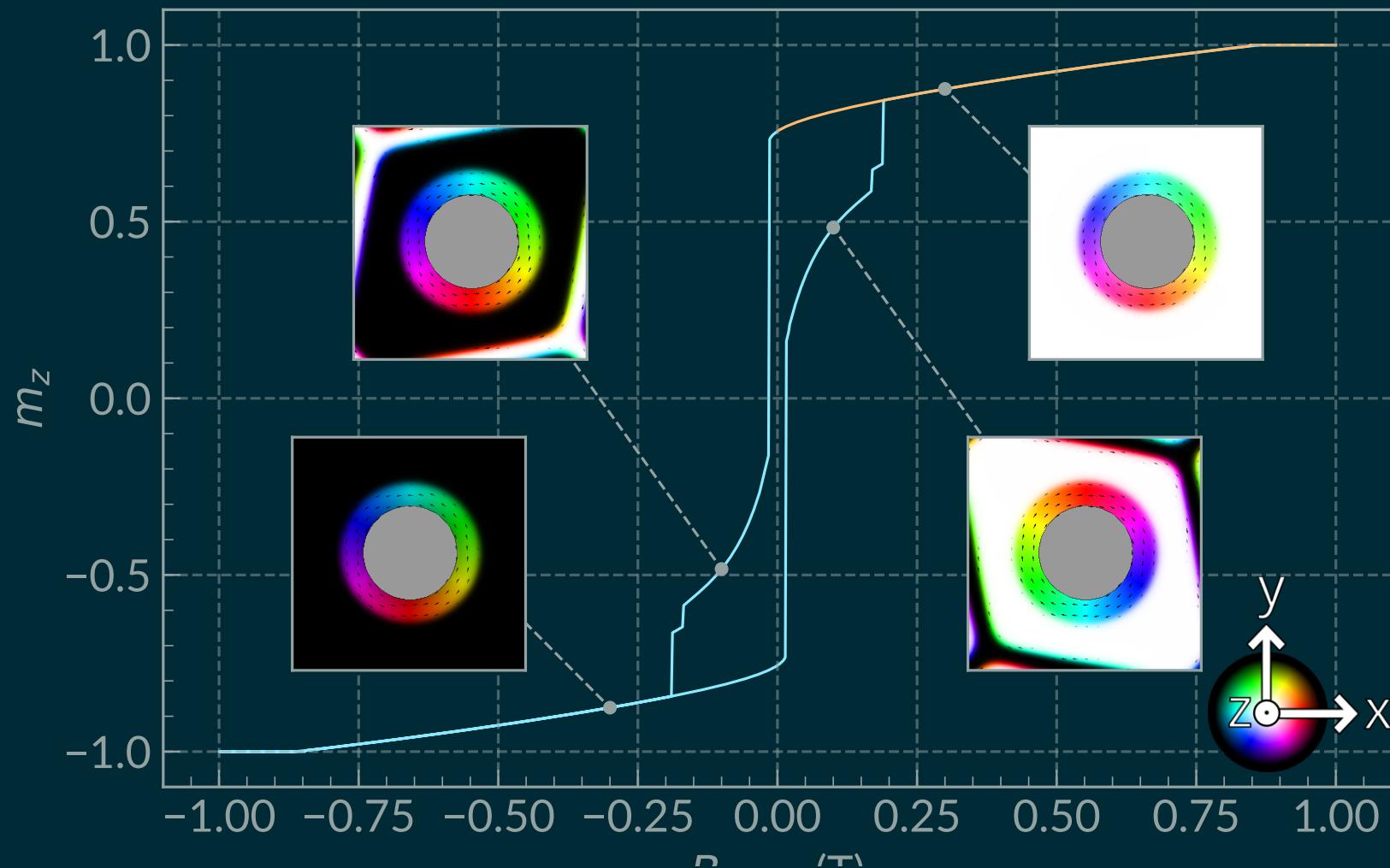
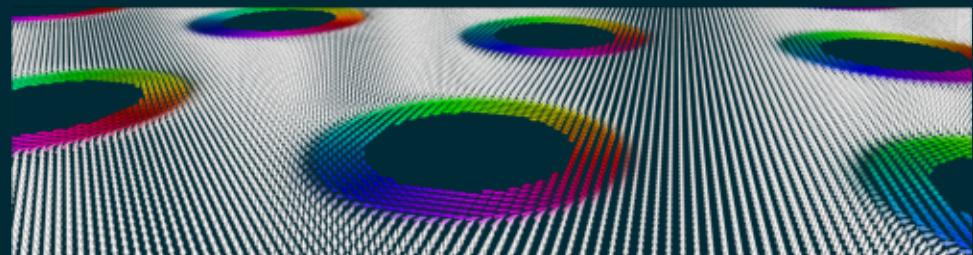
Exchange Stiffness = 13 pJ/m

Out-of-Plane Anisotropy = 453 kJ/m<sup>3</sup>

Gyromagnetic ratio = 187 rad.GHz/T

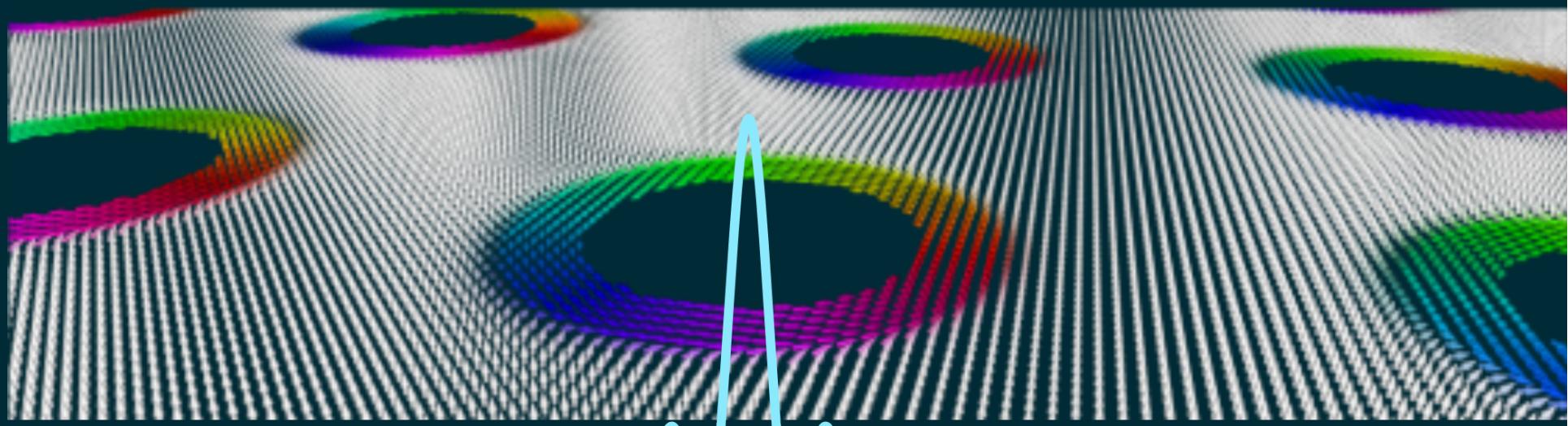
Pal, S., et al. "Tunable magnonic frequency and damping in [Co/Pd] 8 multilayers with variable Co layer thickness." Applied Physics Letters 98.8 (2011): 082501.

# HYSTERESIS



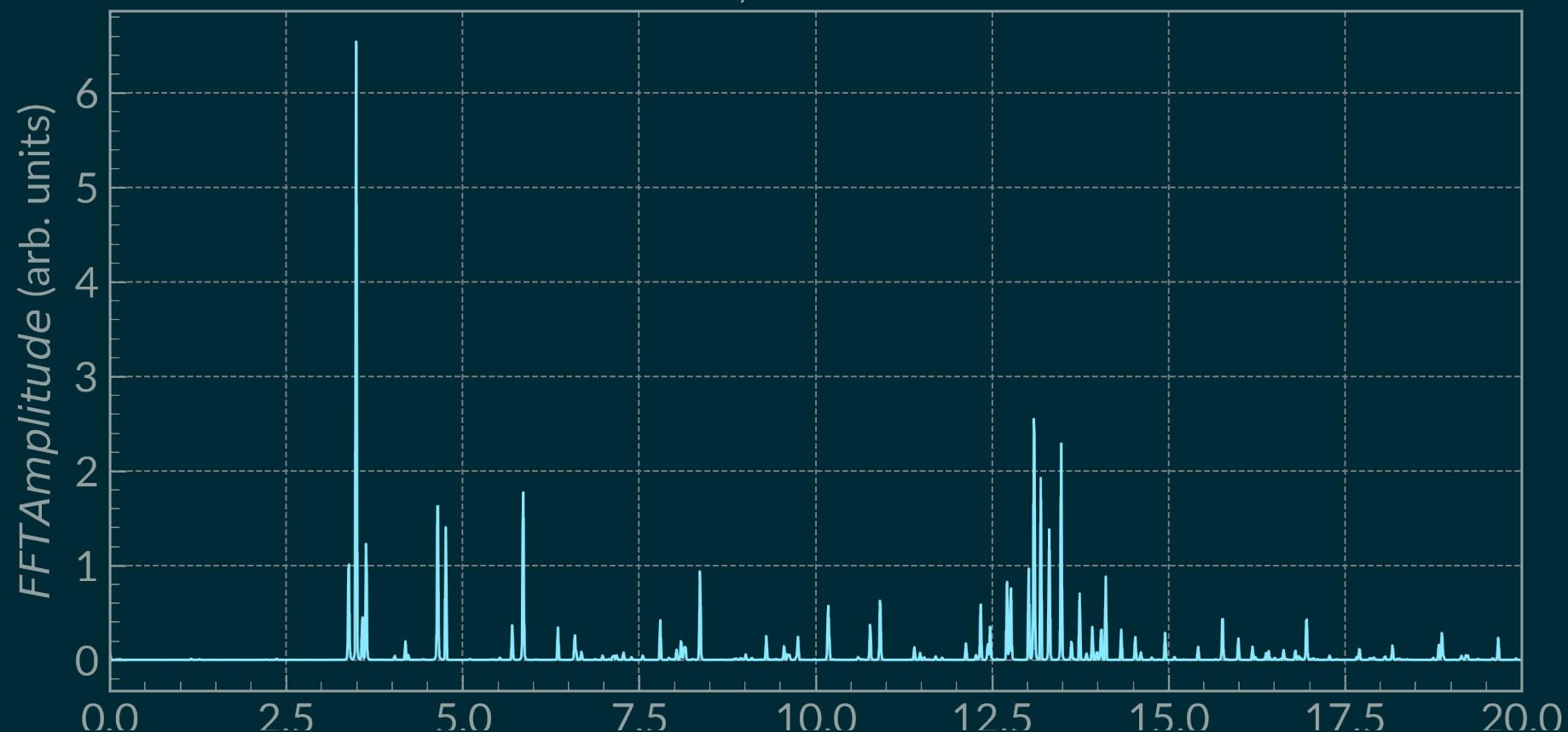
# EXCITATION

Homogeneous, in-plane excitation with a sinc function  
in time



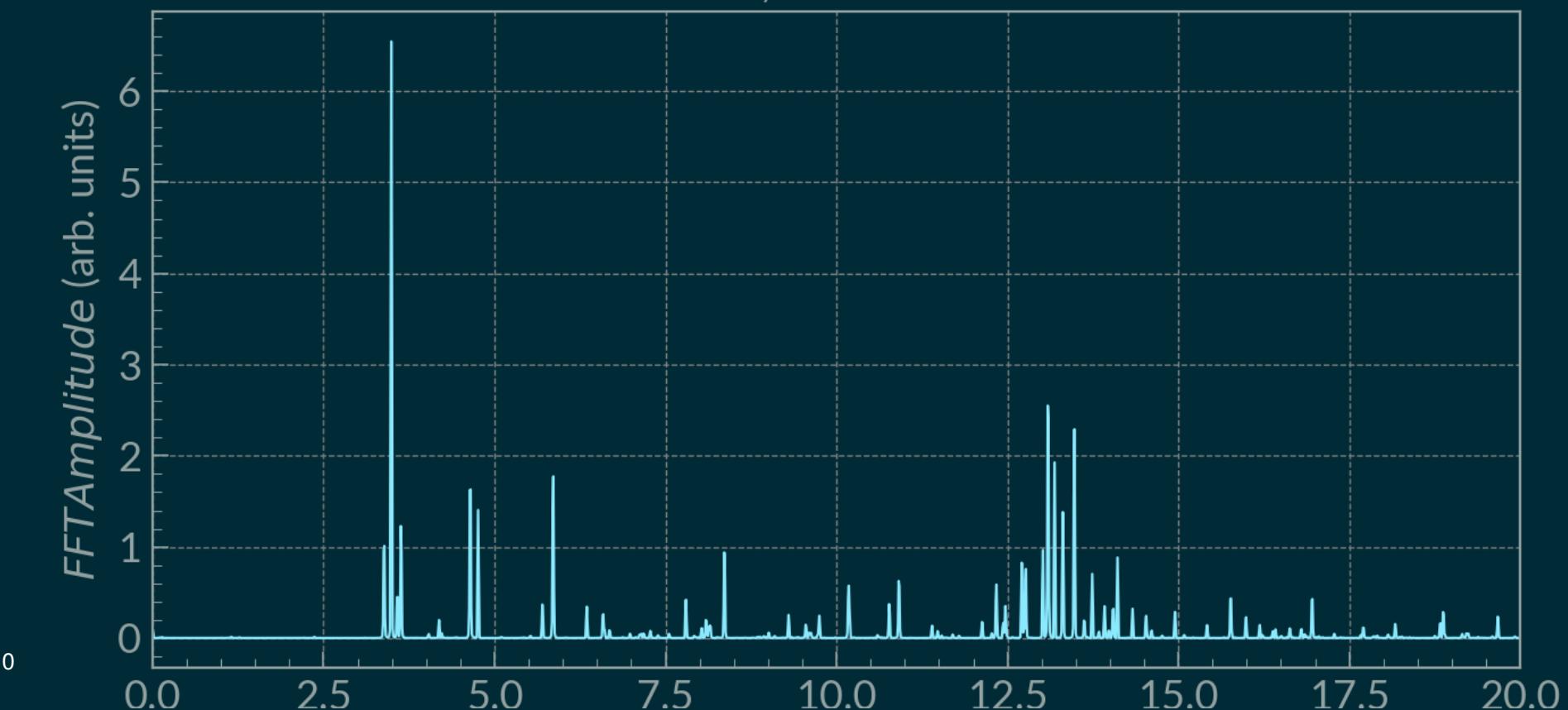
# DYNAMICS

$B_{ext, z} = 0 \text{ mT}$

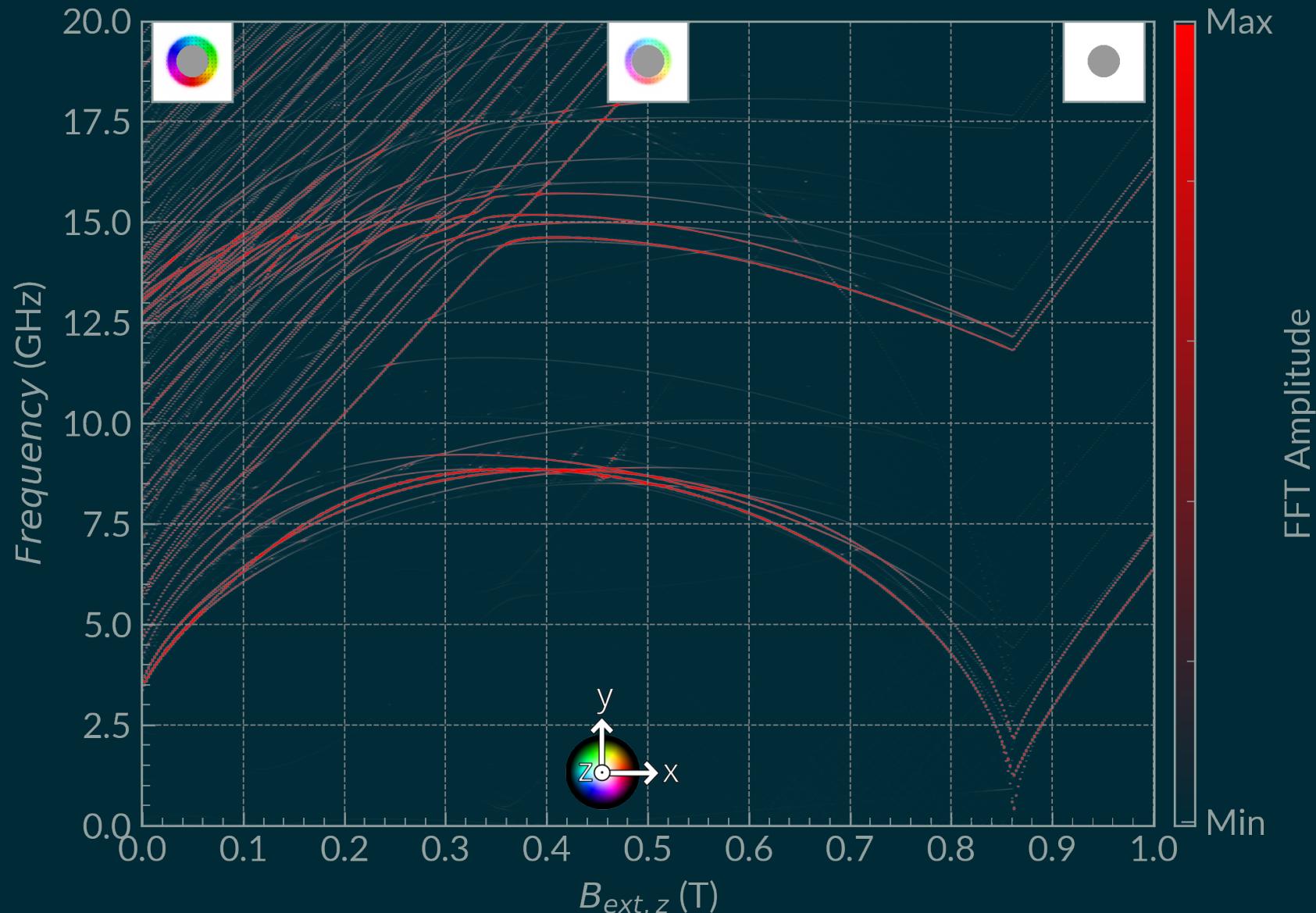


# DYNAMICS

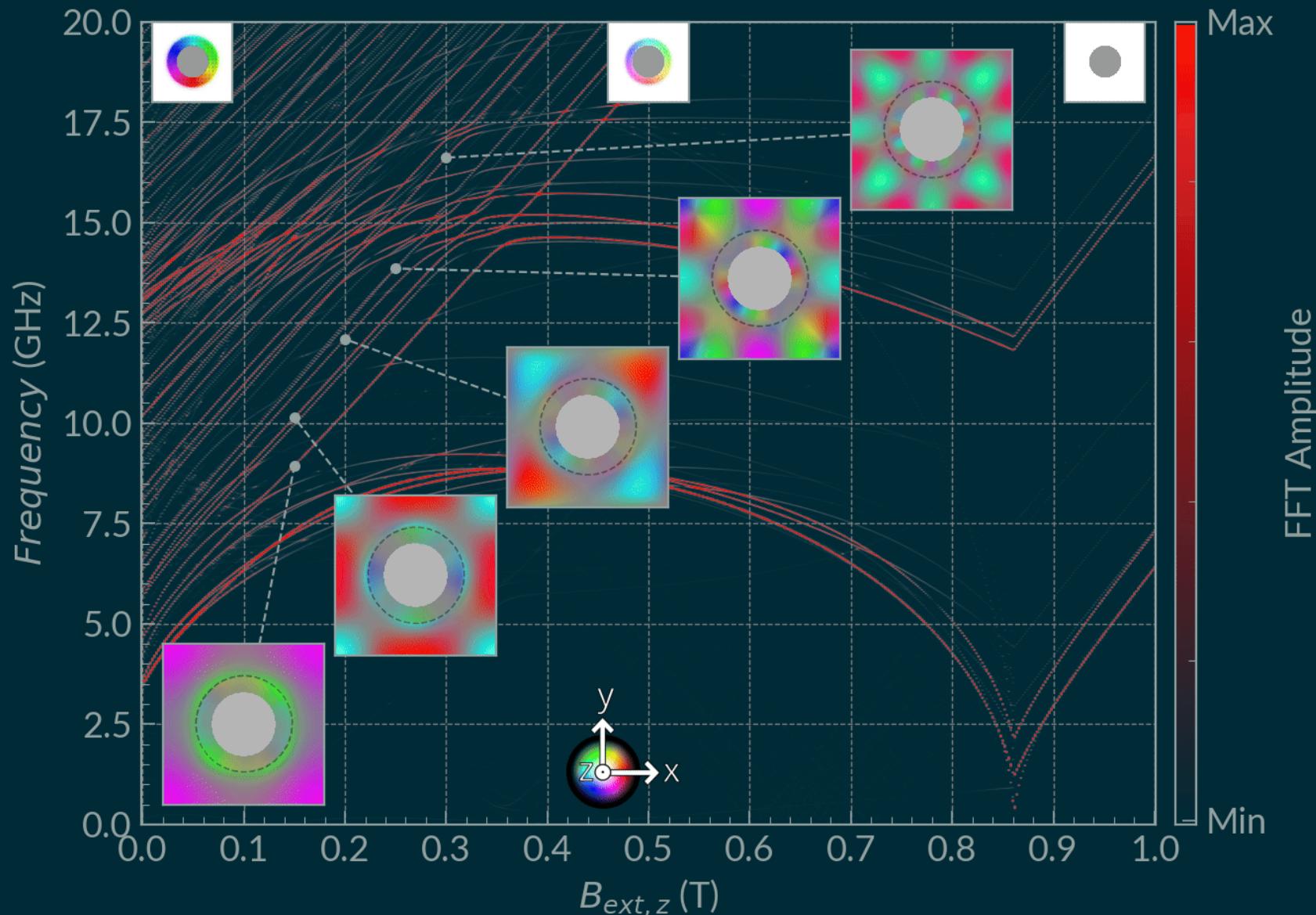
$B_{ext,z} = 0 \text{ mT}$



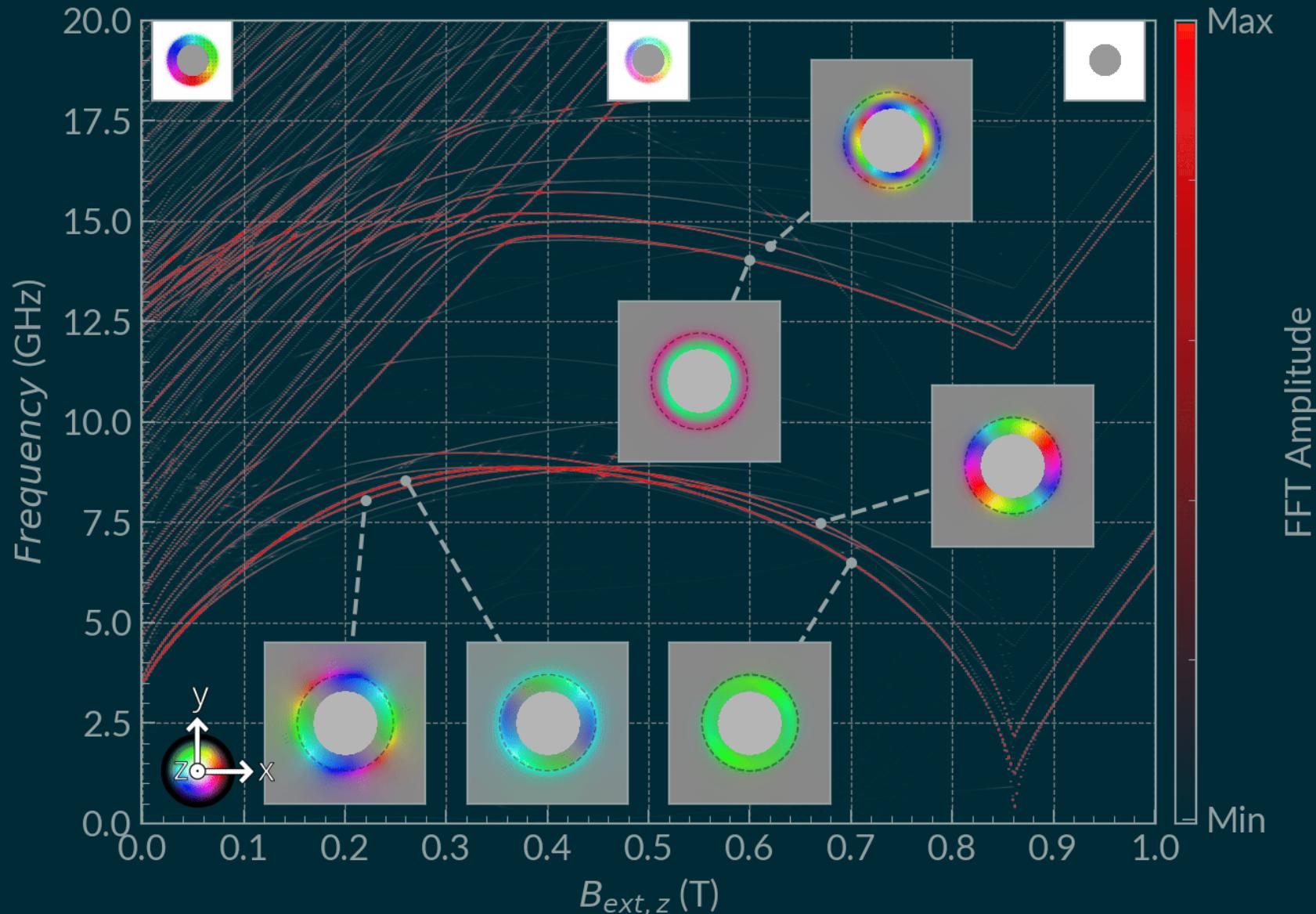
# SPIN WAVE MODES AS WE INCREASE THE EXTERNAL FIELD



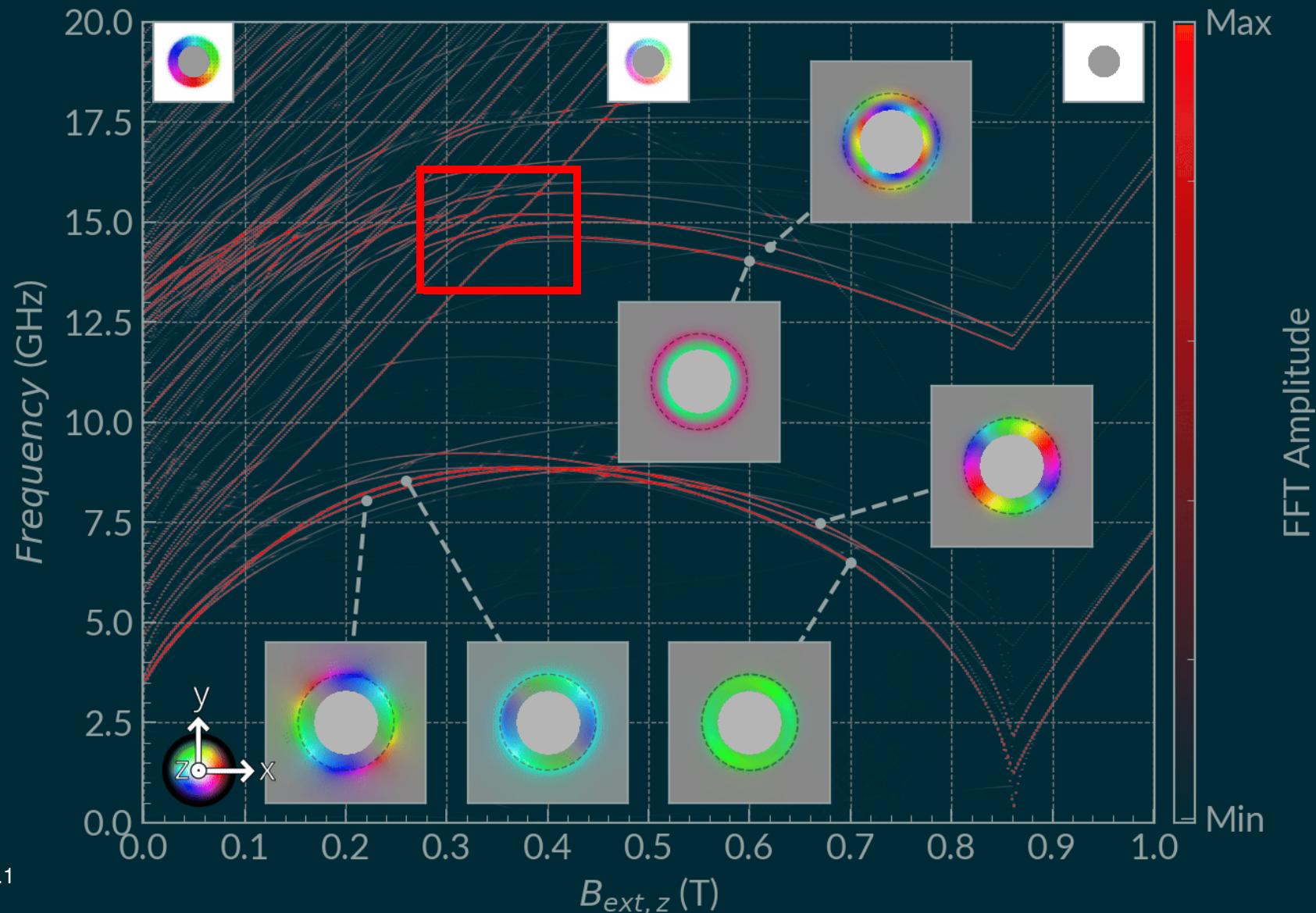
# BULK MODES AS WE INCREASE THE EXTERNAL FIELD



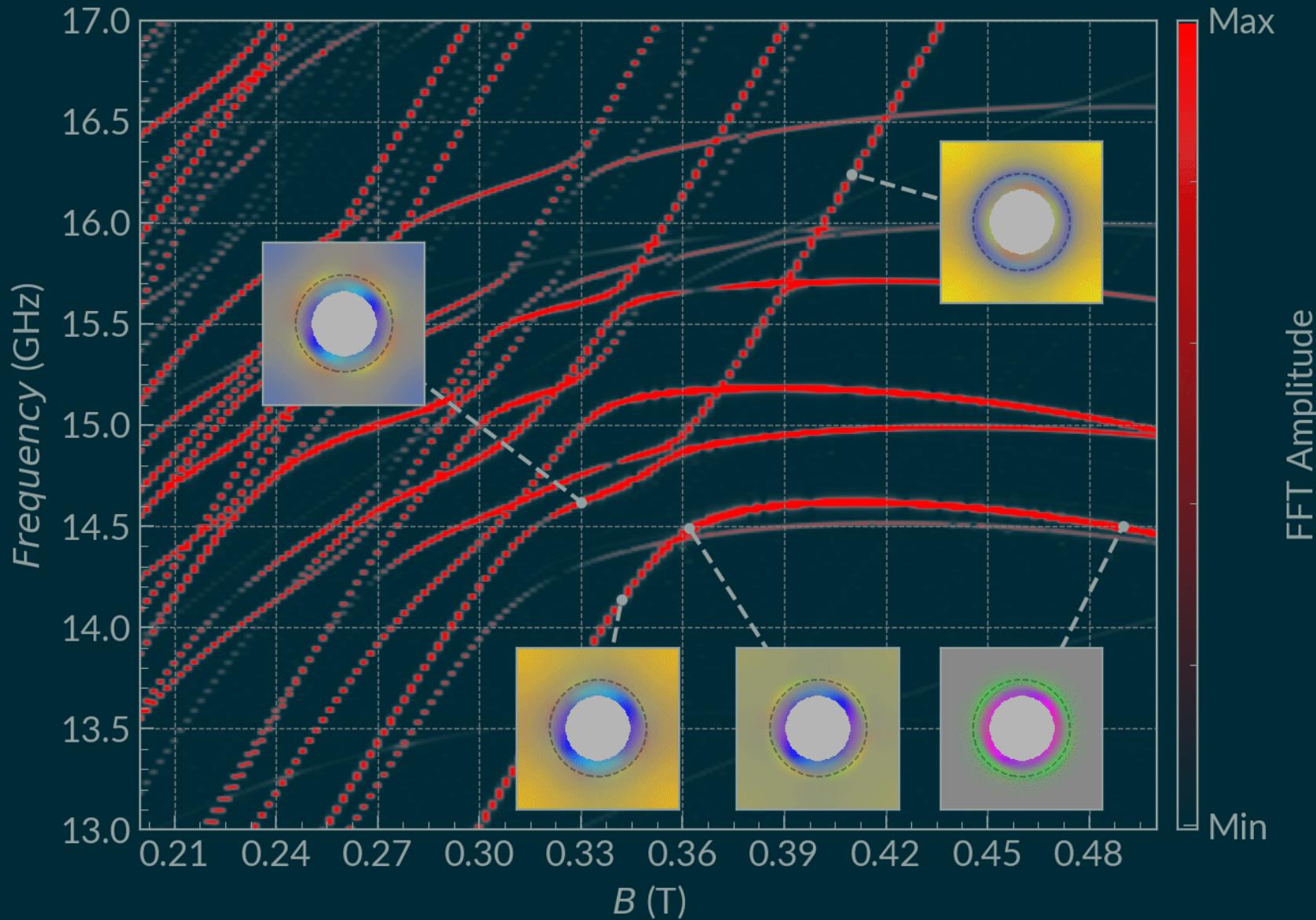
# RIM MODES AS WE INCREASE THE EXTERNAL FIELD



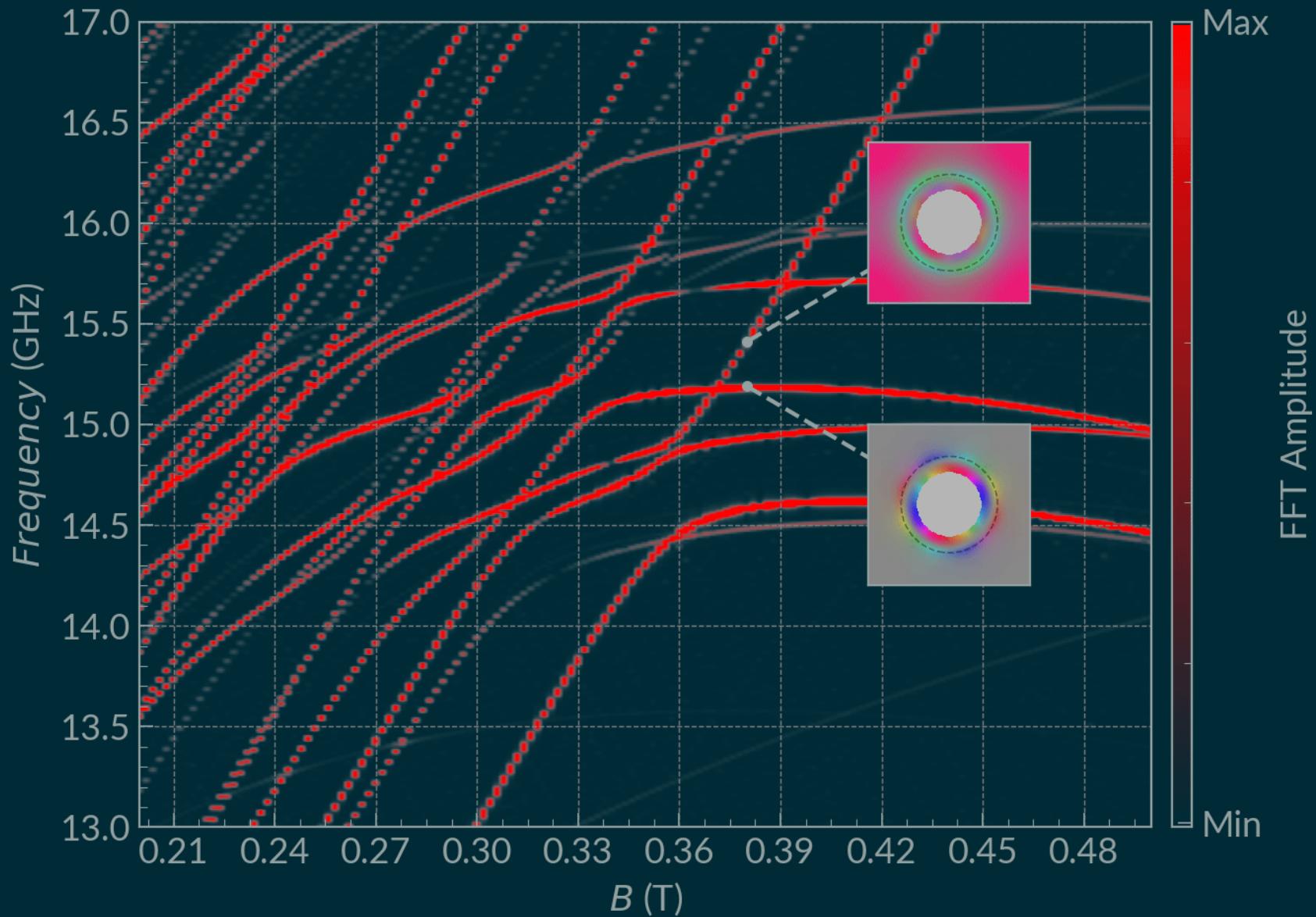
# RIM MODES AS WE INCREASE THE EXTERNAL FIELD



# HYBRIDIZATION OF RIM AND BULK MODES



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# CONCLUSION

- The bulk-rim coupling depends on the lattice type and the mode orders
- We observe complexe rim modes even with a simple unidirectional excitation
- Next step is to study the spin wave propagation and studying the magnonic band structure of the magnonic crystal

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**THANK YOU FOR YOUR ATTENTION**