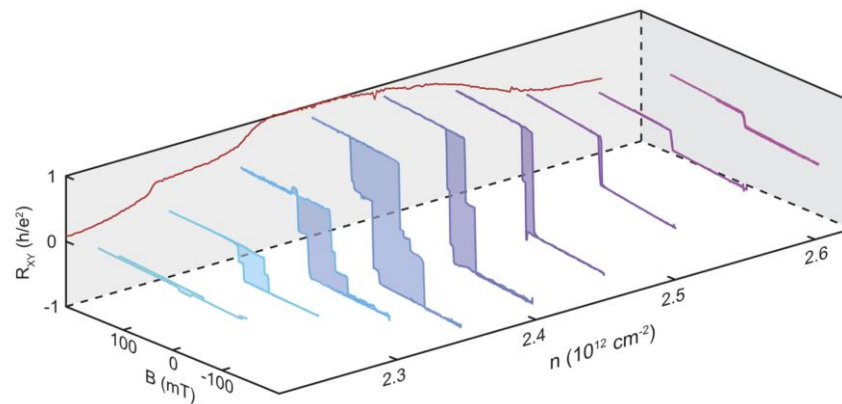
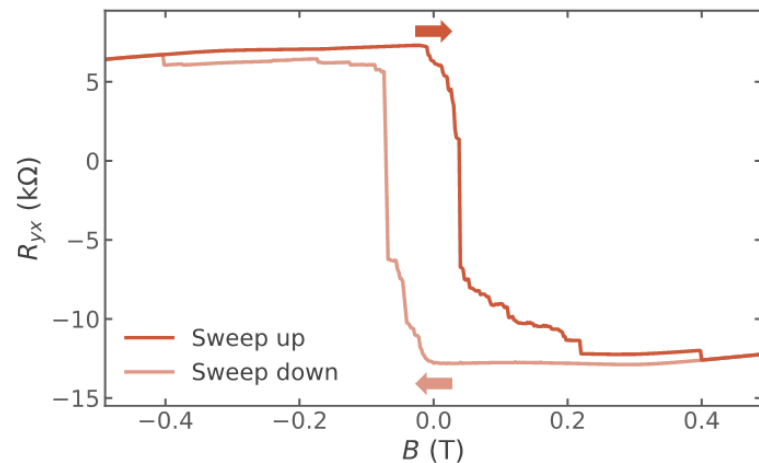


Systematically Aligning Graphene and Hexagonal Boron Nitride

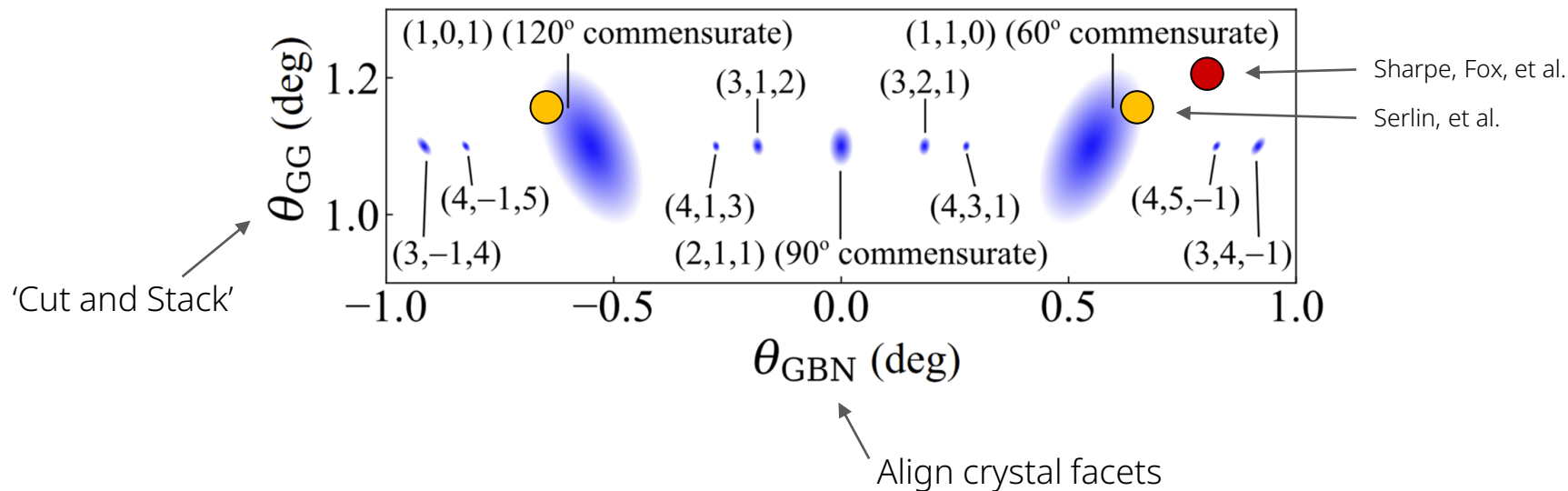
Aaron Sharpe
Sandia National Lab

Out of the 100s of MATBG samples



Two samples show QAH. What makes them different?

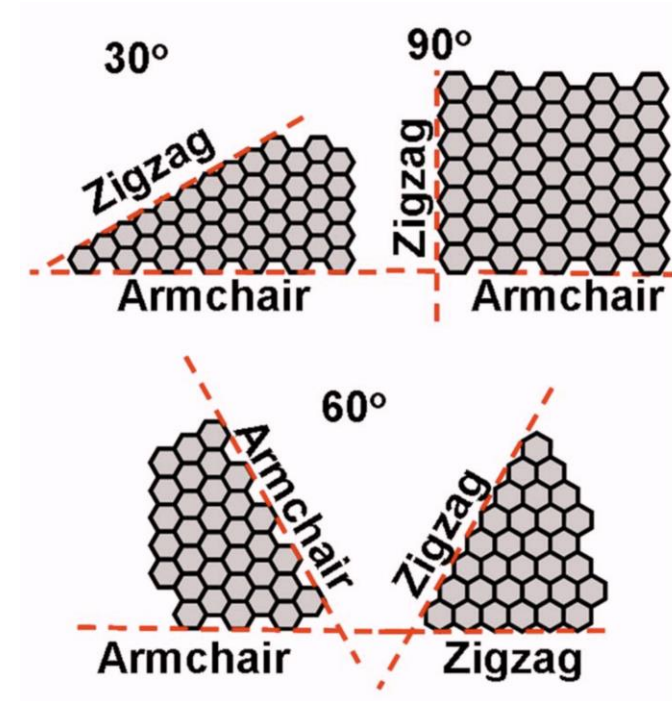
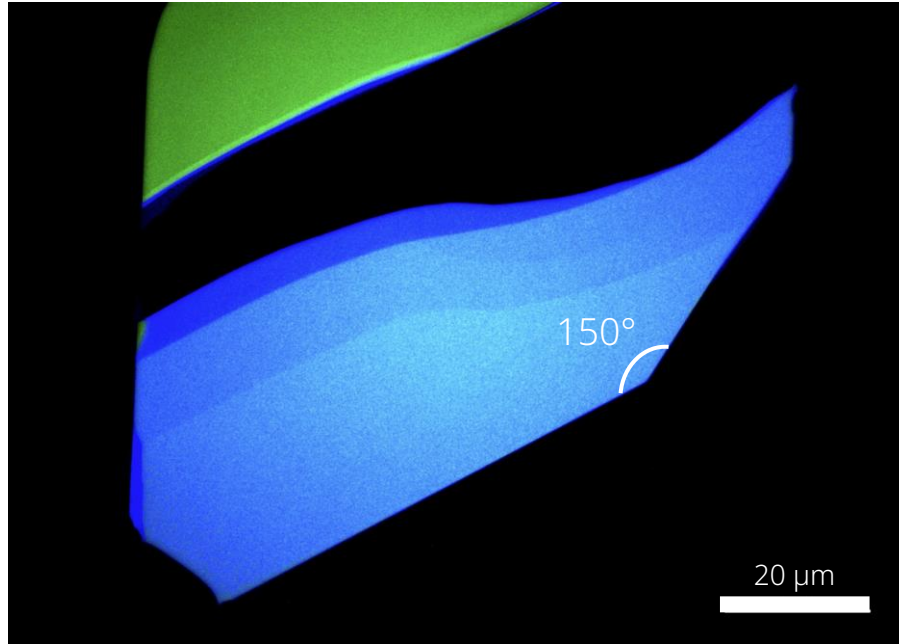
hBN alignment is key?



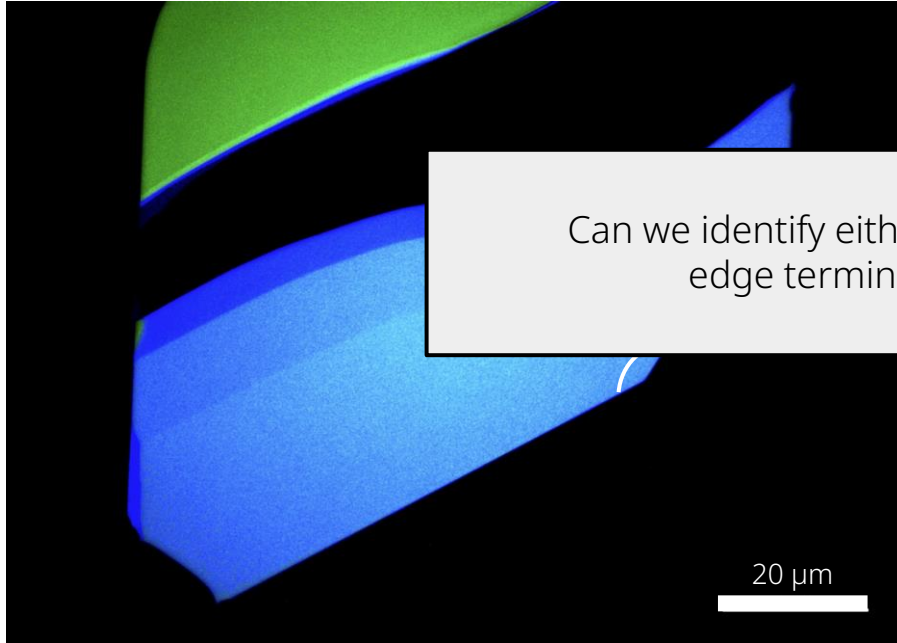
For near zero θ_{GhBN}

		Graphene edge	
		Zig-Zag	Armchair
hBN edge	Zig-Zag	✓	✗
	Armchair	✗	✓

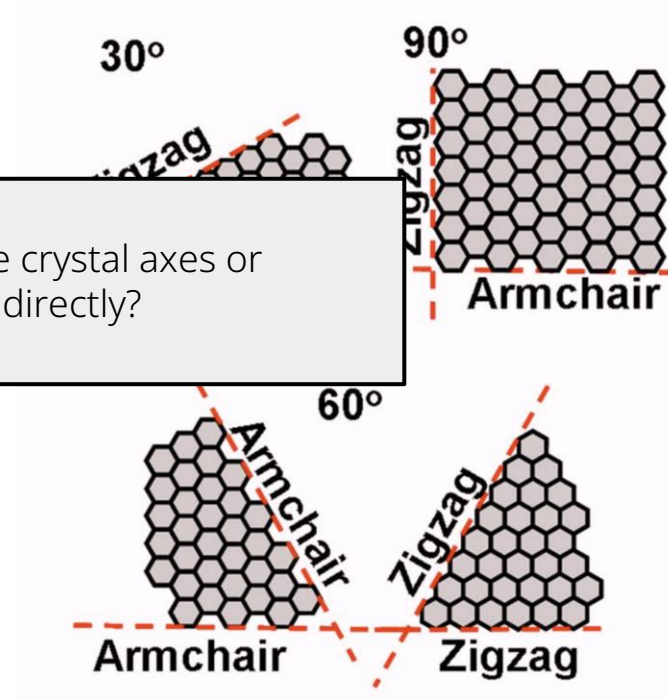
Uncertainty in edge termination



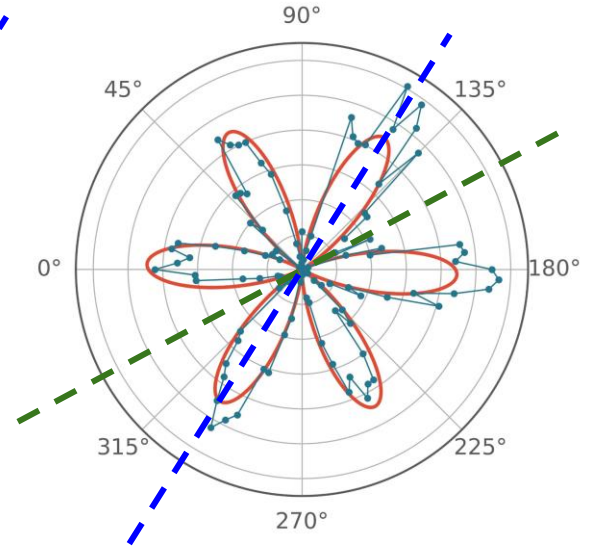
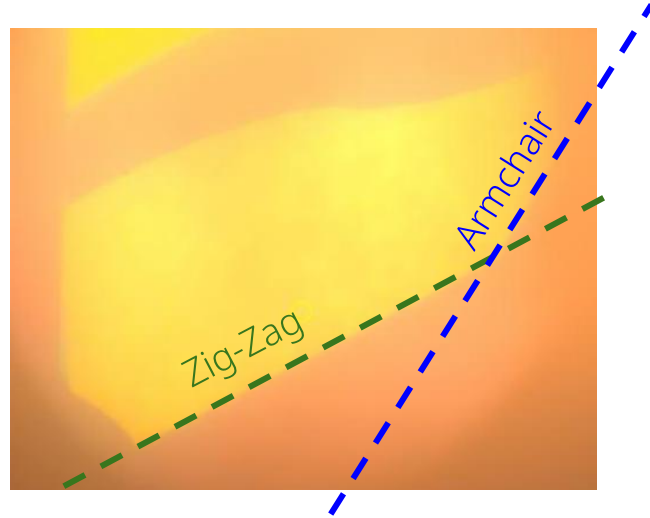
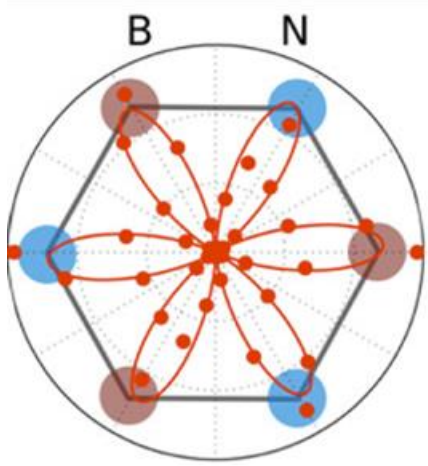
Uncertainty in edge termination



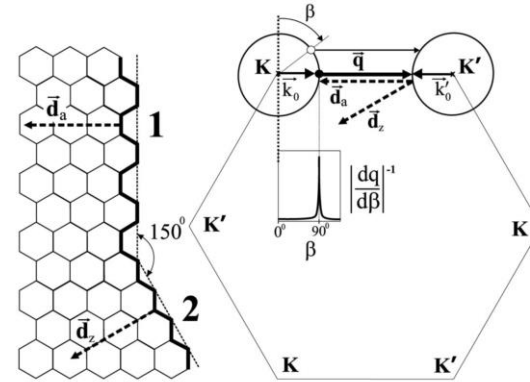
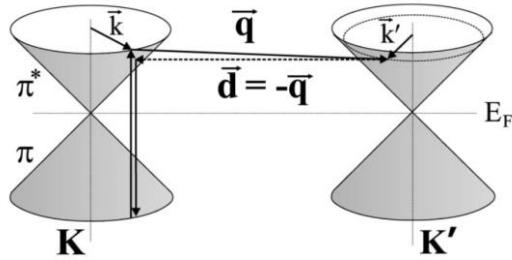
Can we identify either the crystal axes or edge termination directly?



Characterizing hBN: Second Harmonic Generation

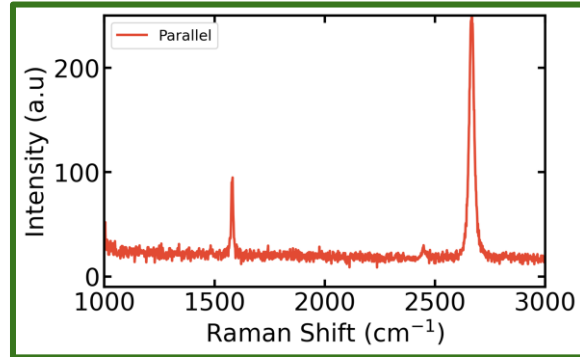
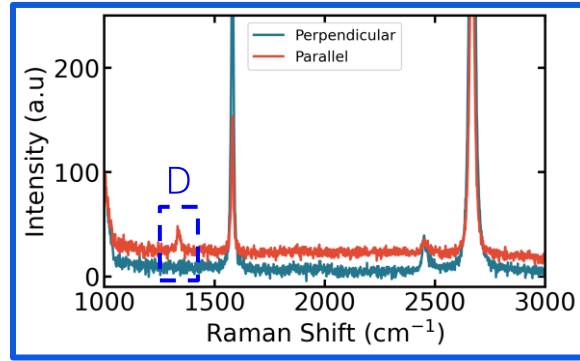
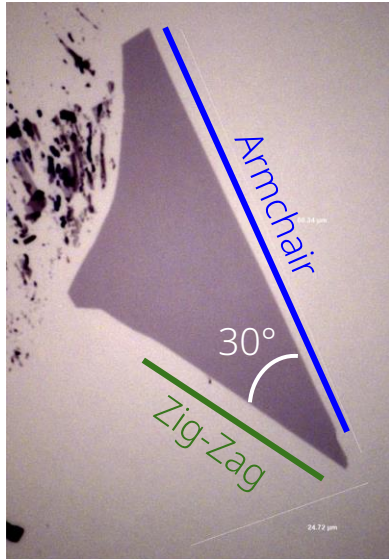


Characterizing Graphene: Polarized Raman

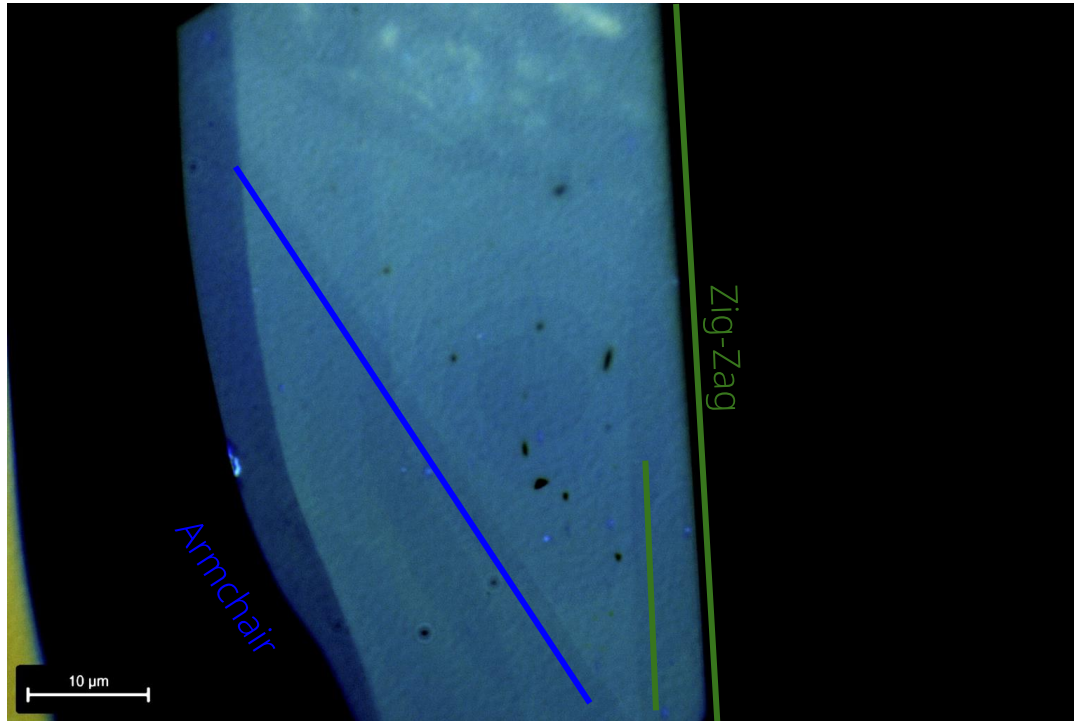


Edge and polarization dependent Raman process
in graphene!

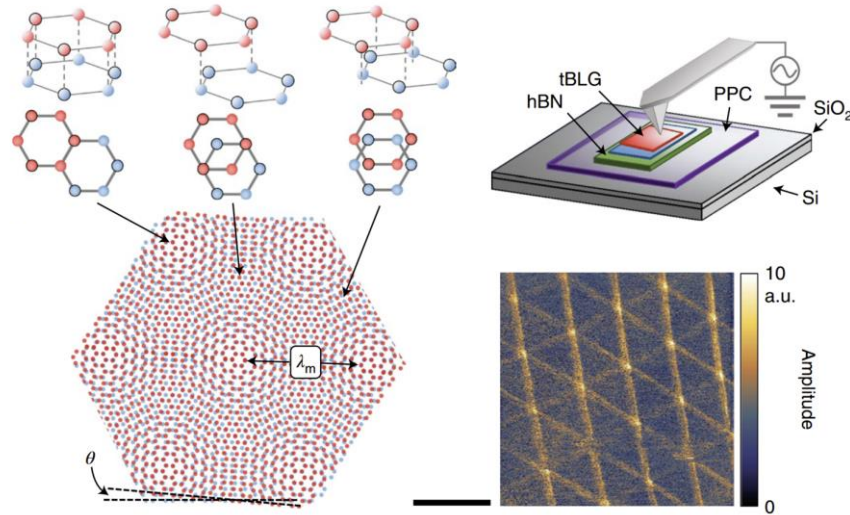
Characterizing Graphene: Polarized Raman



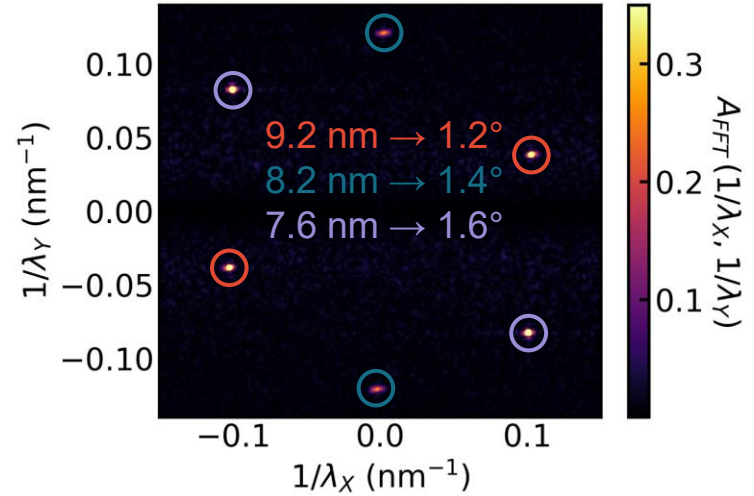
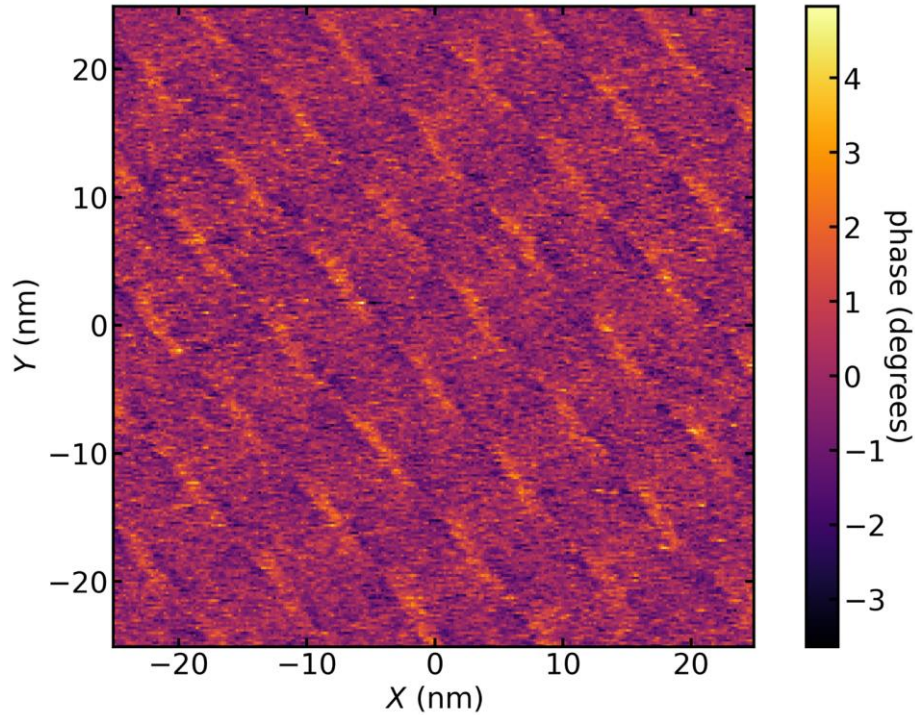
Align and stack



Post-stack Characterization: PFM



Post-stack Characterization: PFM



Outlook

- Fabricate transport device from G/hBN stack
 - Compare transport results to PFM
- We have the tool-kit to unambiguously stack graphene and hBN (except A vs A' stacking of hBN)
- Time to start taking data points within θ_{GG} - θ_{GhBN} phase diagram!

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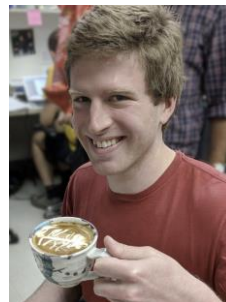
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