Returning CP-Observables to The Frames They Belong

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Theo Heimel[1], and Tilman Plehn[1]

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2 Department of Physics, Oklahoma State University, Stillwater, USA

Summary

- idea: apply ML unfolding to CP-violation detection in $pp \to ht\bar{t}$

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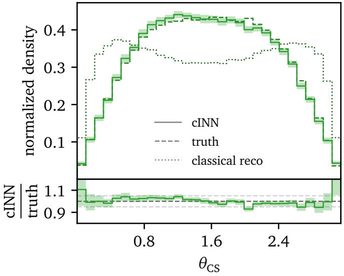
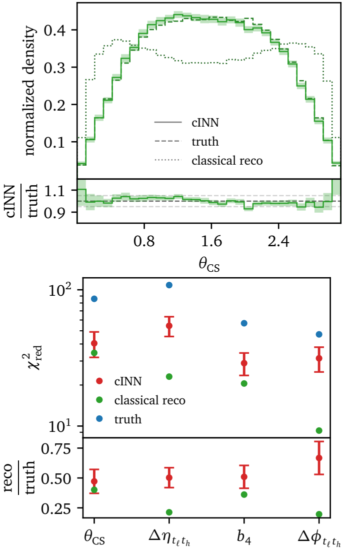


Summary

- idea: apply ML unfolding to CP-violation detection in $pp \to ht\bar{t}$
  - allow for reconstruction of CP-sensitive observables
  - improve sensitivity



SciPost Physics Submission

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  Higgs-top Yukawa coupling

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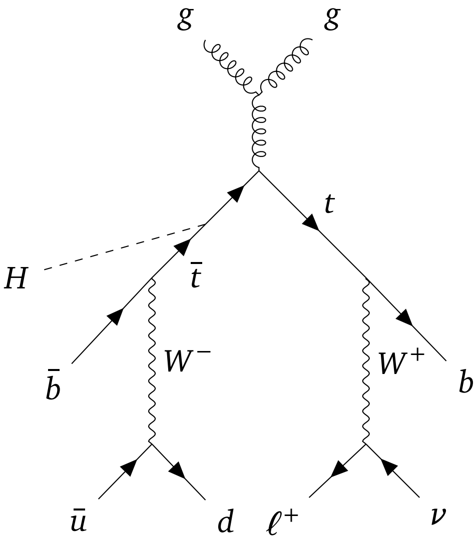
- most direct probe: $t\bar{t}h$ production



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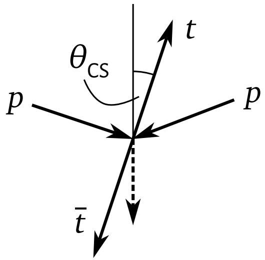

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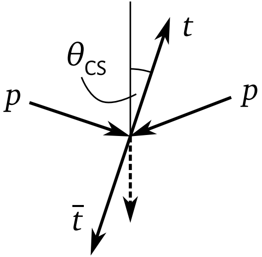

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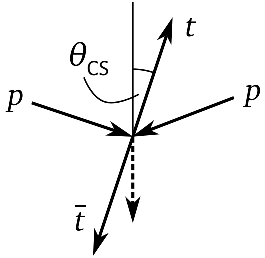

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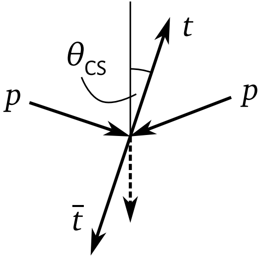

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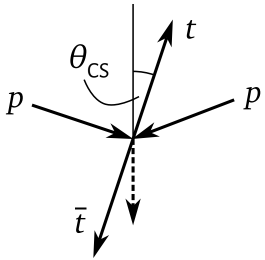
CP-sensitive Observables

- Look at four CP-sensitive observables
- Identified as most sensitive by Barman et al (arXiv:2110.07635v2)



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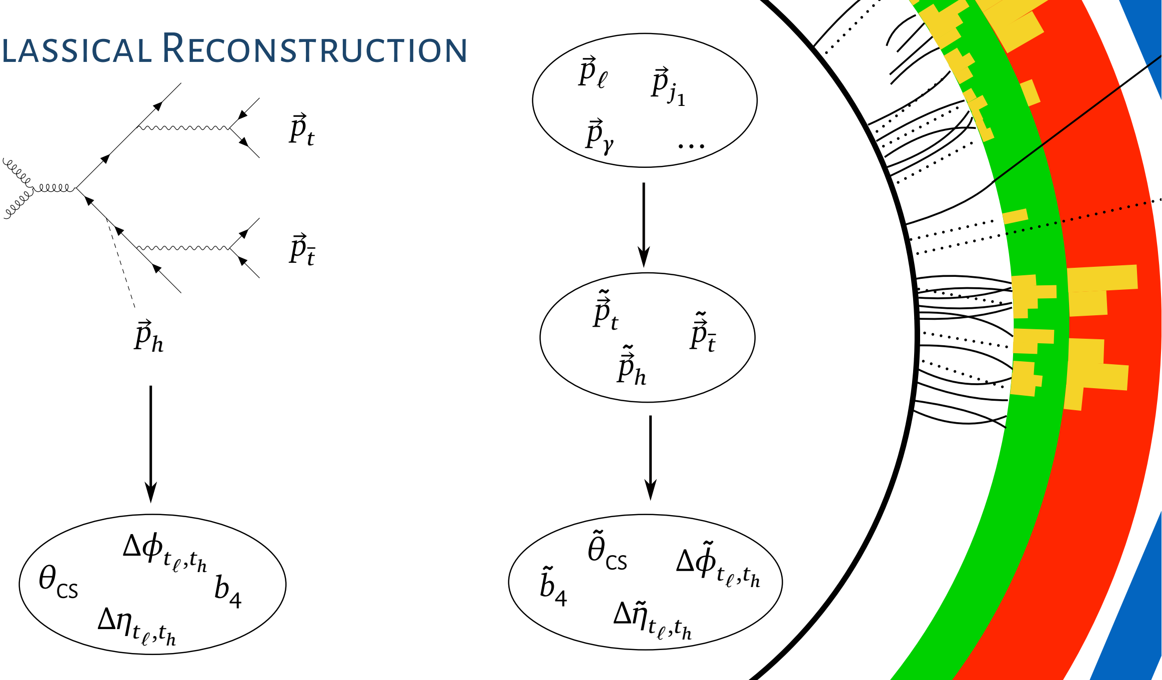
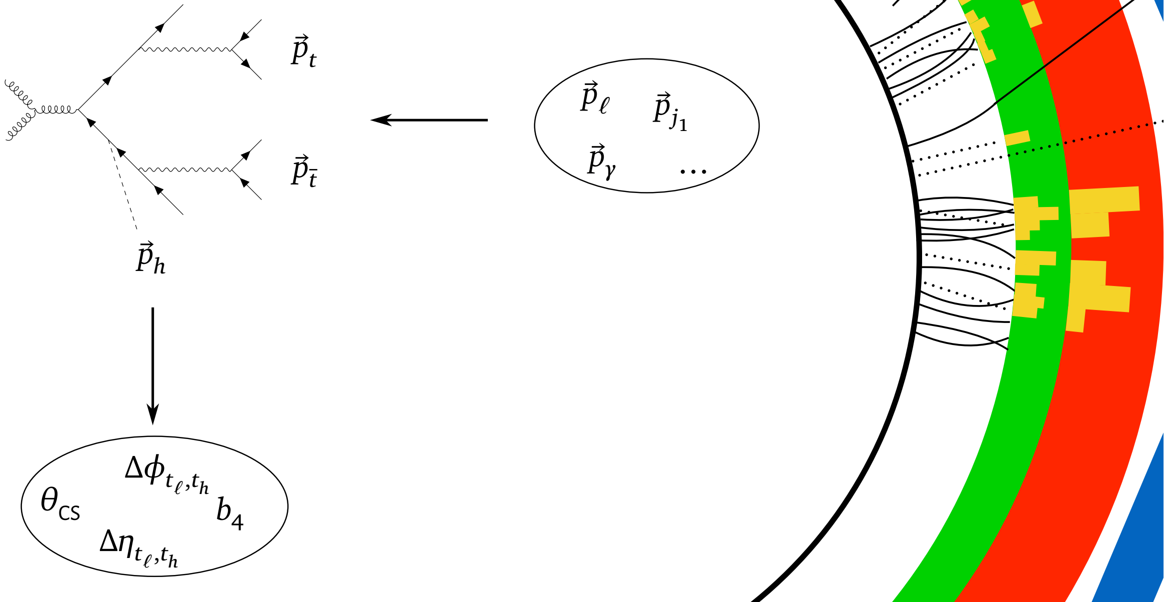
Classical Reconstruction



ML Unfolding



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$$x = (p_h, p_b, p_\ell, \dots) \sim p_{\text{part}}(x)$$

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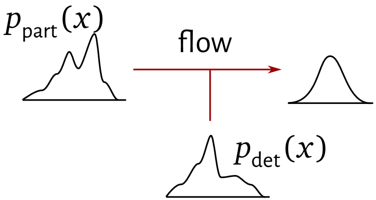
Training



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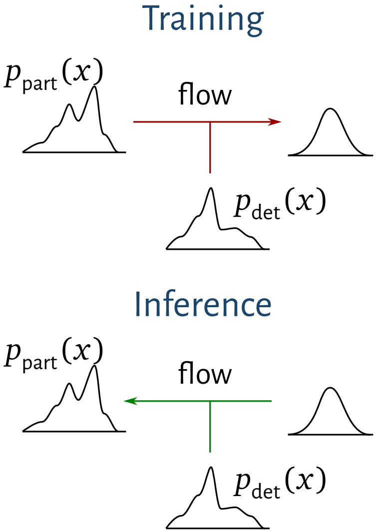
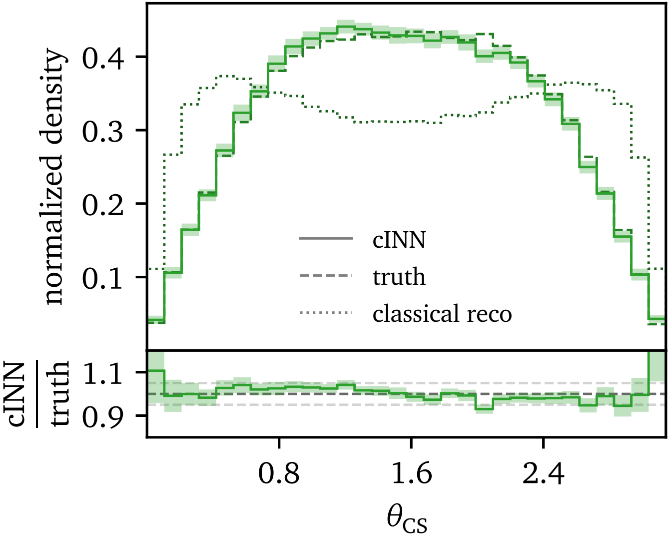


Observable Reconstruction



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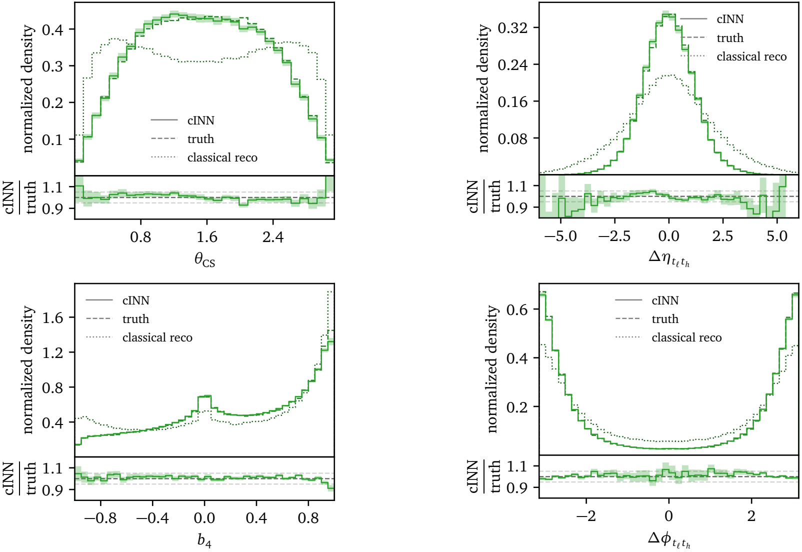
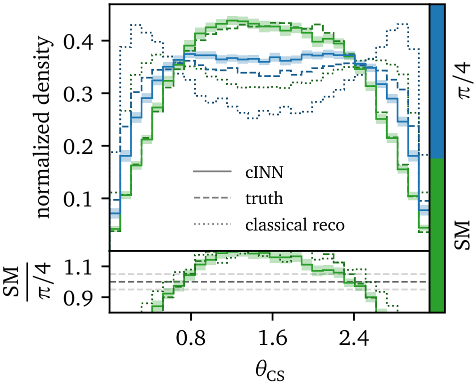


Sensitivity



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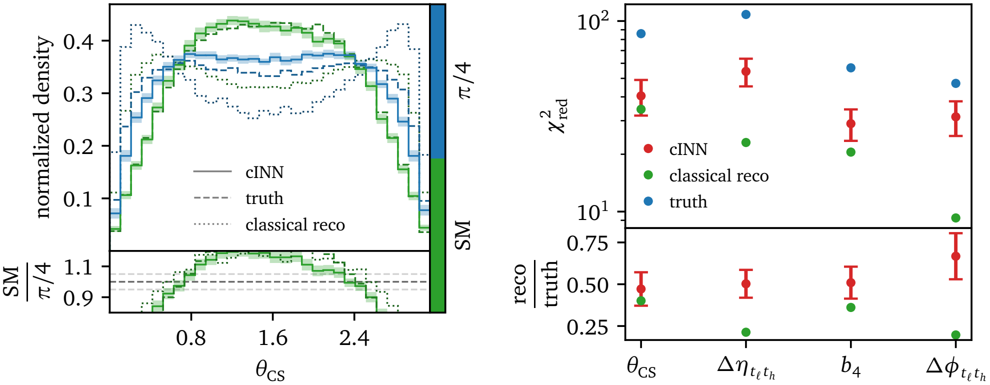

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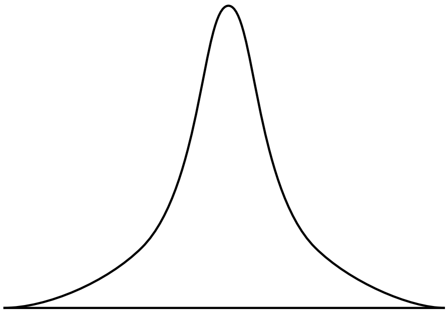

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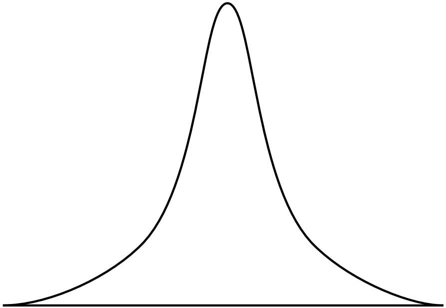
→ use phase space parameterization that includes intermediate masses



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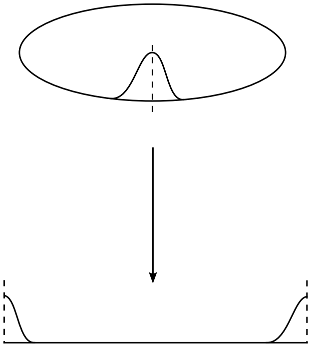

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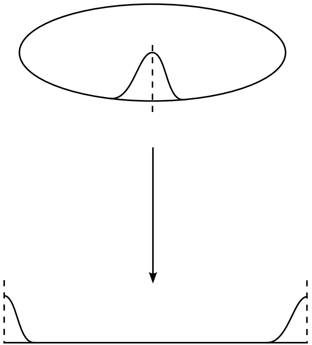
→ adapt flow architecture with periodic coupling blocks



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- proper treatment of experimental limitations