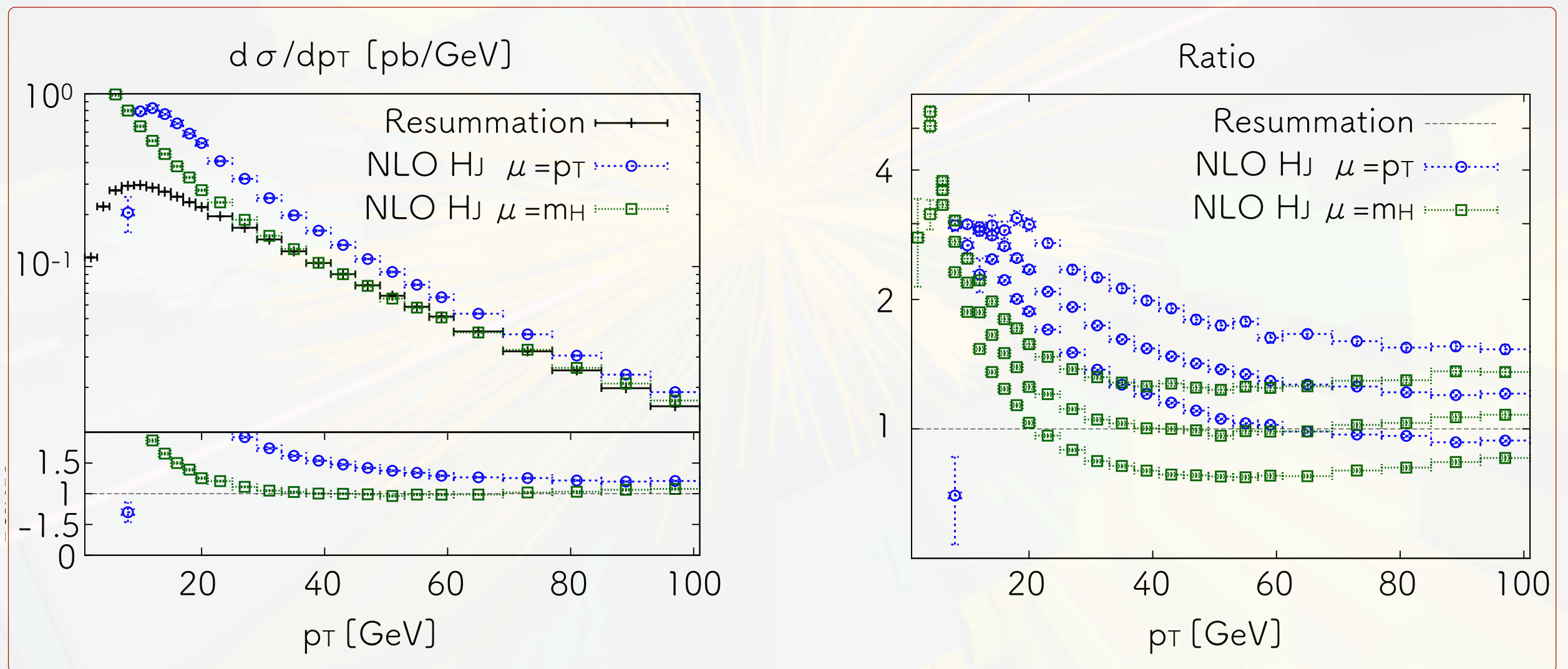


### Q3: if worrying about scale logs why not other large logs?

- Residual NNLO scale dependence of NLO calc<sup>n</sup>s is  $\sim \alpha_S^{N+2} B \log \frac{\mu_R^2}{Q^2}$
- But often have situations where NNLO corr<sup>n</sup>s is  $\sim \alpha_S^{N+2} B C^2 \log^4 \frac{Q^2}{p_T^2}$



- Even if you make a 'good scale choice' in predicting some observable such IR Sudakov logs can be as or more significant than scale logs

# MiNLO: Multi-scale improved Next-to-leading Order

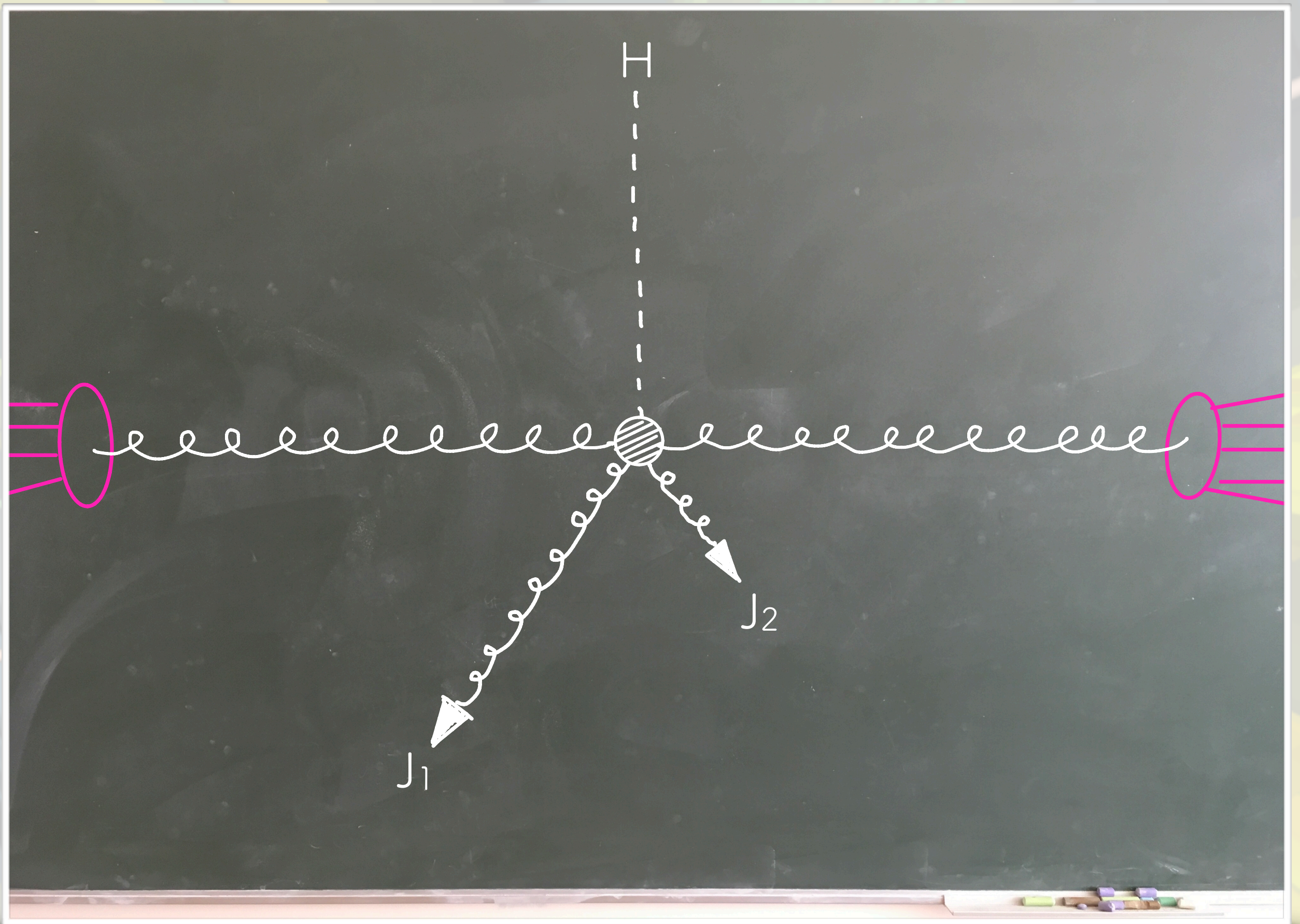
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Nason, Zanderighi, KH

- Ask how a parton shower generate the Born kinematics in the NLO calc<sup>n</sup>
- Take all beyond-NLO corr<sup>n</sup>s to that and put on top of the NLO calc<sup>n</sup>
- A1: small/moderate NLO corr<sup>n</sup>s/scale sensitivity isn't a consideration
- A2: PS have natural uniquely defined scale setting for multi-scale probs
- A3: PS resum large IR double logs as well as single scale logs
- In the context of pure fixed order calc<sup>n</sup>s MiNLO isn't a full shower resummation, but BY FAR captures more event dynamics than a single number for the scale choice



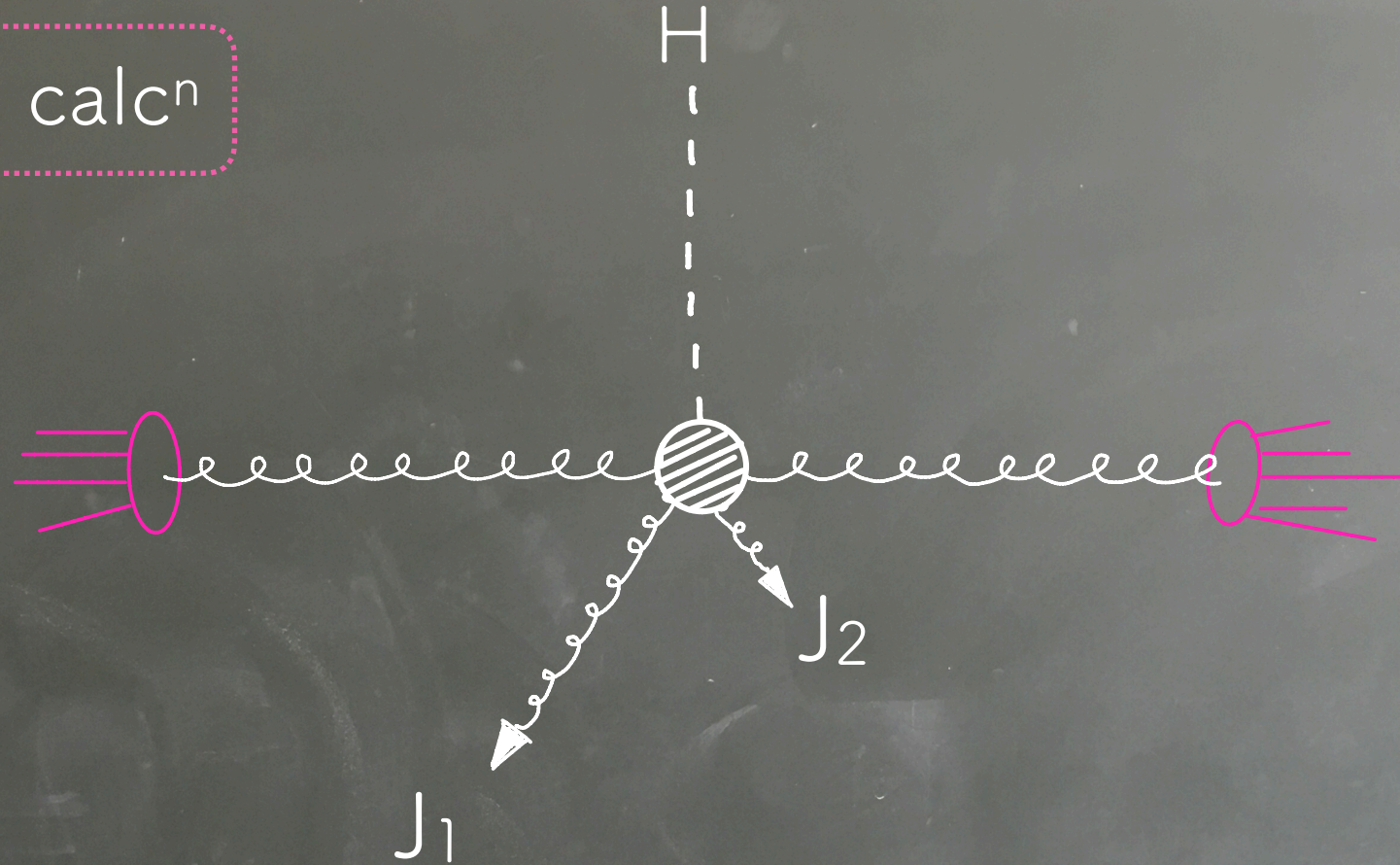
Example:  $H+2$  jets MiNLO at leading order with a broad brush





# Example: H+2 jets MiNLO at leading order with a broad brush

Standard LO calc<sup>n</sup>

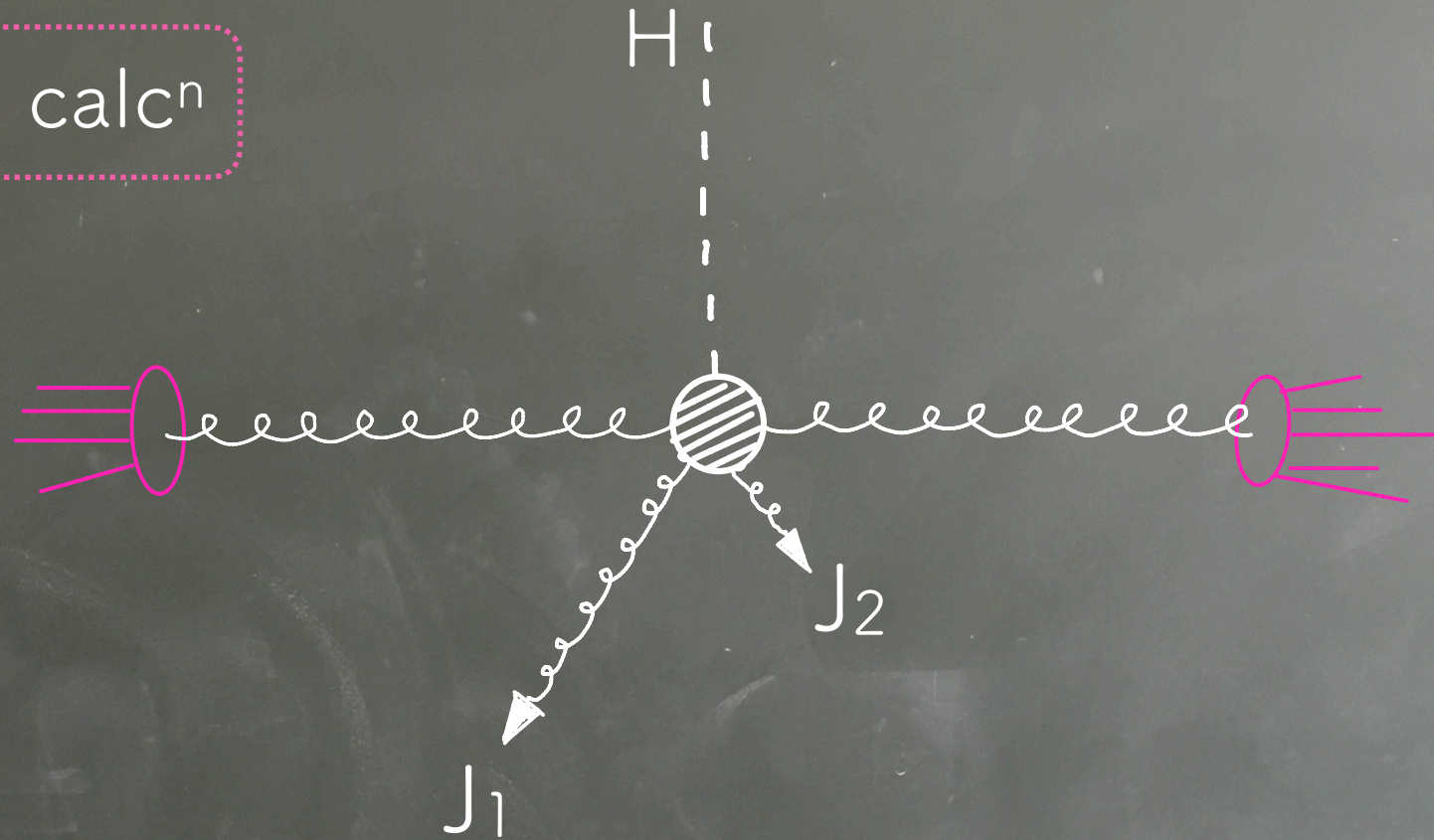


$$d\sigma_{HJJ} = \underbrace{dx_1 dx_2}_{\text{Integrate over incoming momentum fractions}} \underbrace{d\Phi_{HJJ}}_{\text{Phase space for HJJ}} \underbrace{f_{h_1}(x_1, \mu_F) f_{h_2}(x_2, \mu_F)}_{\text{PDFs}} \underbrace{\frac{1}{2\hat{s}}}_{\text{Flux factor}} \underbrace{M(\Phi_{HJJ}, \mu_R)}_{\text{matrix element for HJJ}}$$



# Example: H+2 jets MiNLO at leading order with a broad brush

Standard LO calc<sup>n</sup>



$$d\sigma_{HJJ} = dx_1 dx_2 d\Phi_{HJJ} f_{h_1}(x_1, \mu_F) f_{h_2}(x_2, \mu_F) \frac{1}{2\hat{s}} M(\Phi_{HJJ}, \mu_R)$$

Factorization  
scale

Renormalization  
scale