

Wednesday, April 7, 2021 10:08 AM

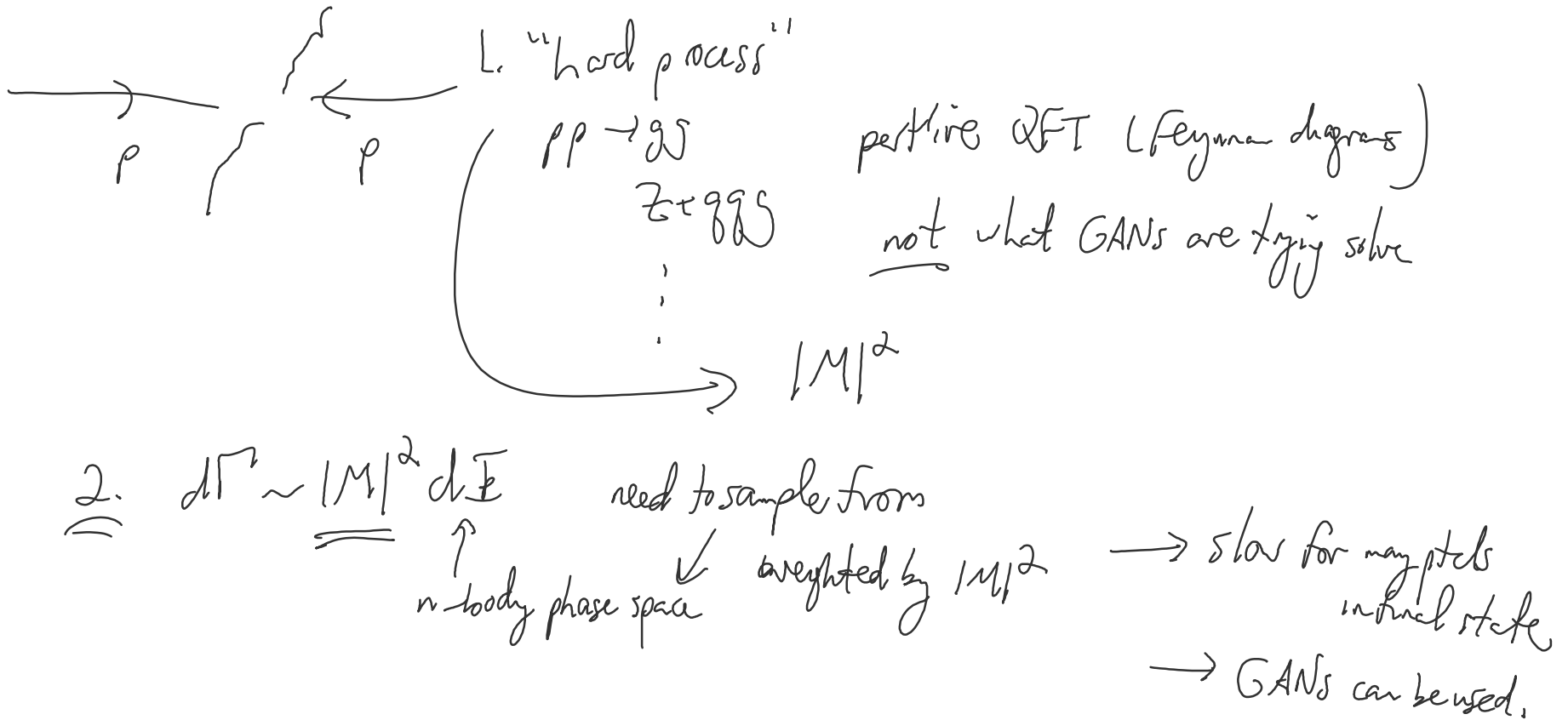
Lecture 20Applications of GANs to HEP/LHC

So far main applications are in speeding up simulations

can be  $10^3 - 10^5$   
significanthigh dimensional phase space  
Sampling/Integrationaccurate modeling of particle  
propagation through materialidea: train GAN on existing simulated data  
can sample from it for "free"(could also consider training  
GAN directly on data!)contrast w/ "real-life" GAN: focus on realism of individual examples!  
dist'n is less important.HEP care alot about dist'n!!  $\rightarrow$  harder problem?

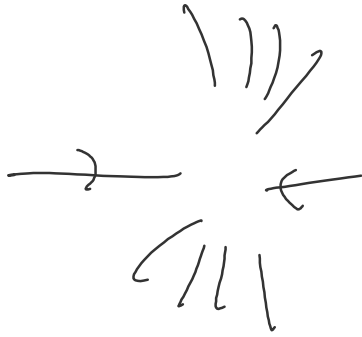
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# Simulation pipeline for collider events:



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3.



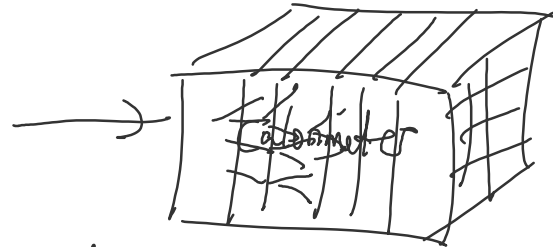
shower  
hadronize

GANs maybe not so useful here

4.



propagate real pteb thru detector (GGANT)



ptel thru calorimeter - showers both laterally and into

GANs can  
be very  
useful!