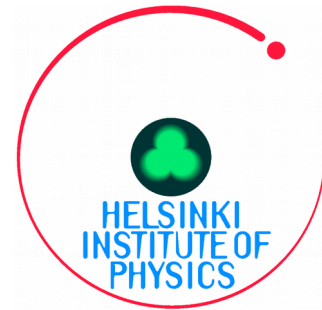


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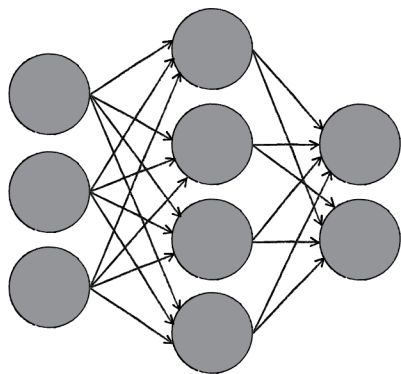
# Machine learning in High Energy Physics

Joonas Havukainen,  
Helsinki Institute of Physics,  
12.12.2016

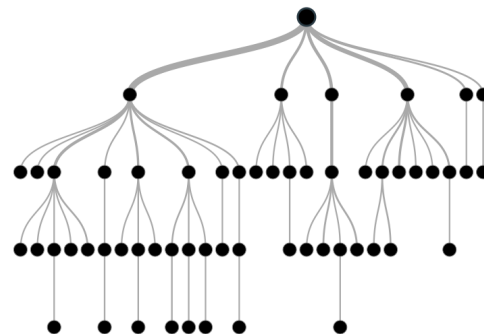
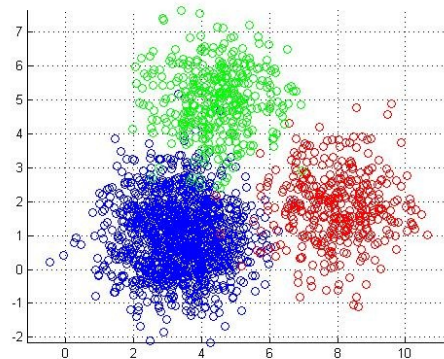


# Machine learning

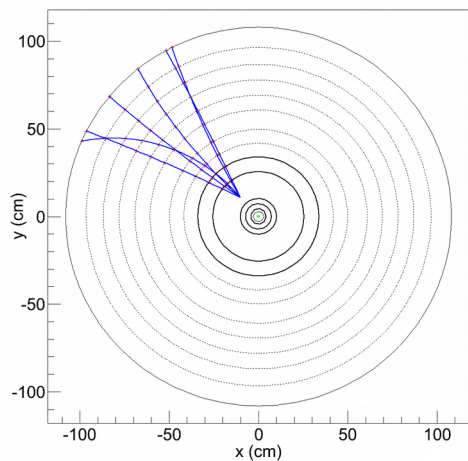
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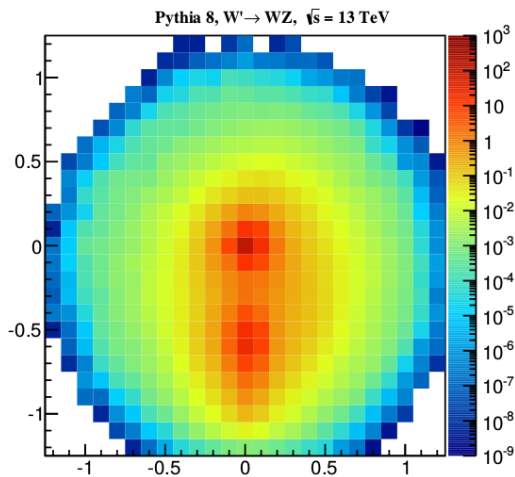
Allow the algorithm to look at large amounts of data and make predictions based on it



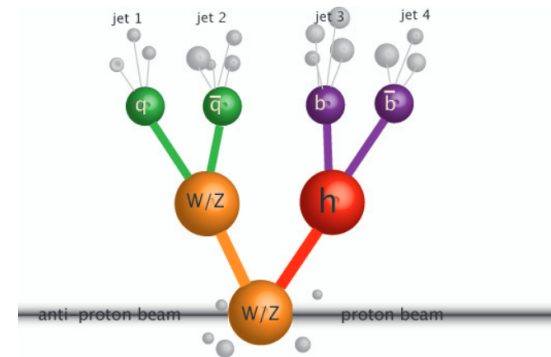
# Applications in HEP



Track reconstruction



Jet identification



Event selection

## For the interested

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### Track reconstruction:

Machine learning and parallelism in the reconstruction of LHCb and its upgrade  
Michel De Cian, LHCb Collaboration, Connecting the Dots Proceedings, CERN-LHCb-PROC-2016-019 (2016)

### Jet identification:

Jet-images — deep learning edition

Luke de Oliveira (Stanford U., Math. Dept.), Michael Kagan (SLAC), Lester Mackey (Stanford U., Statistics Dept.), Benjamin Nachman, Ariel Schwartzman (SLAC),  
JHEP 1607 (2016) 069, arXiv:1511.05190

### Event selection:

Identification of signal events in a search for  $H \rightarrow b\bar{b}$  produced in association with single top quarks

A.Popov, CMS Collaboration, TOP2014 Proceedings, CMS-CR-2014-416 (2014),  
arxiv:1411.7170