Machine Learning Topical Group

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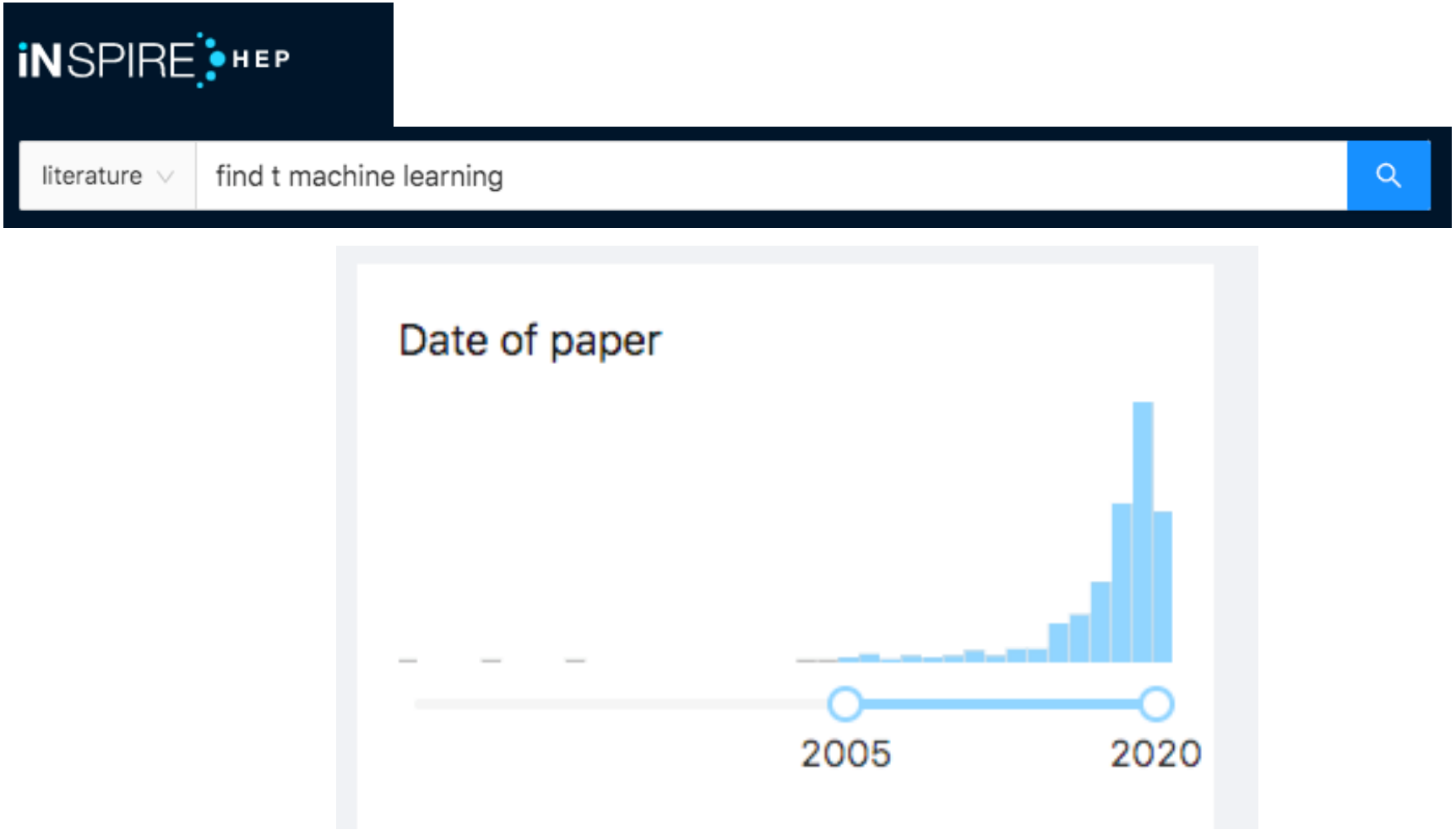
The future of ML



Scope

ML is everywhere in HEP

- cannot describe all ML applications

Expect a lot of overlapping efforts

- organize group around several themes

Still getting organized

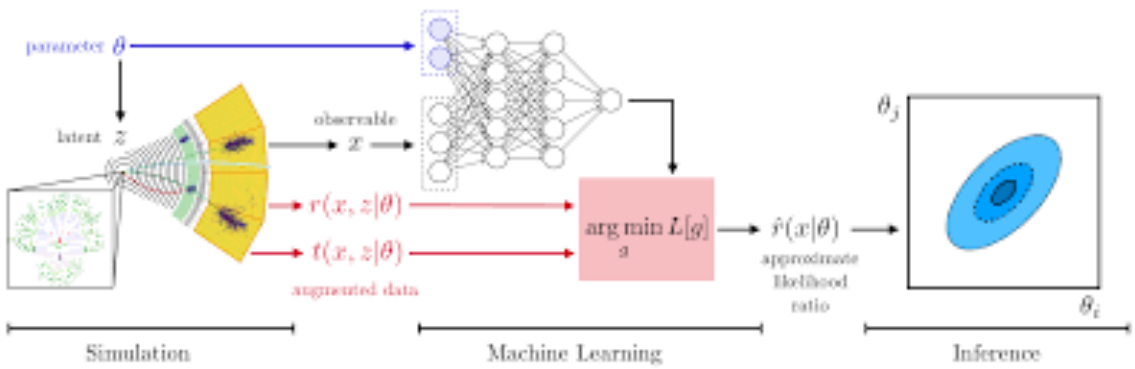
- plenty of time for you to contribute!

Particle physics-specific ML

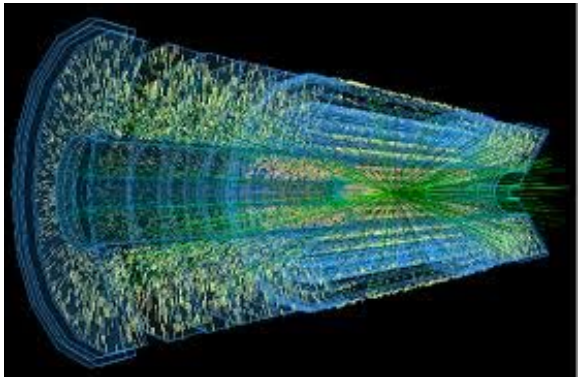
Particle physics often has unique stats challenges

- Symmetries, boundaries, limits
- Data on manifolds or subsurfaces
- Sensitivity to uncertainties
- Heterogenous data structures

Patrick Komiske will discuss this afternoon



Simulation and ML



Simulation very expensive

- Fast simulation with ML
- Limitations and possibilities

Anja Butter will discuss this afternoon

Interpretability/validation

What has the machine learned?

- Reverse engineering ML strategy
- Exactness proofs
- Uncertainty measures
- Data reconstruction

Andrew Larkoski will discuss this afternoon

Community Tools

Standard tools and packages

- Software
- Data structures
- Adapting industry tools

Dan Guest will discuss Tuesday

Resource needs

What computing resources are needed?

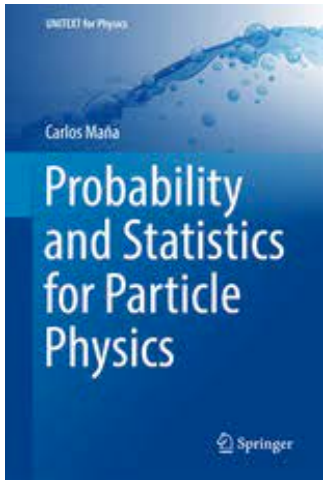
- Real-time ML
- Clusters with GPUs, FPGA, etc
- Cloud processing
- Operations intelligence

Javier Duarte will discuss Tuesday

Education

What do physicists need to know?

- Physics-ML specific courses?
- Outreach to community (ie CS/ML)
- Curation of open data
- Ethics and safety of AI



Savannah Thais will discuss Tuesday