Contribution ID: **11**   Type: **Talk**

Toward the end-to-end optimization of experimental design

Monday, 23 August 2021 15:15 (45 minutes)

In the past few decades particle physics has made giant leaps by studying matter at the shortest distance scales with detectors built on a few paradigms (track-first-destroy-later, redundancy, cross-verification and calibration) which worked very well, but which today look increasingly misaligned with the progress of information-extraction procedures. In addition, our technology nowadays allows for non-planar geometries and solutions that may significantly boost the performance of those devices. However, the construction choices live in a hundreds-dimensional parameter space which humans cannot probe. The result is a huge potential loss in performance.

Our saviour may be differentiable programming, which allows to create precise models of detectors, pattern recognition and inference extraction, cost, other constraints, and detector-related systematic uncertainties, as well as, crucially, a carefully constructed objective function. Backpropagation through a differentiable pipeline of all the elements of the problem may allow to probe the design space and realign design and goals of experiments that base their operation on the interaction of radiation with matter, besides finding entirely new ways to solve our detection problems.

In this seminar I will illustrate how we can set out to create the interfaces to solve our difficult optimization problems, with great prospects for future endeavours that allow for time and resources to carry out such studies.

Is this abstract from experiment?

No

Name of experiment and experimental site

MODE

Is the speaker for that presentation defined?

Yes

Details

T.Dorigo is the speaker, talk needs >=30', best as plenary lecture

Internet talk

No

Primary author: DORIGO, Tommaso (Universita e INFN, Padova (IT))

Presenter: DORIGO, Tommaso (Universita e INFN, Padova (IT))

Session Classification: Lectures