McMicken College of Arts & Sciences
University of Cincinnati

dianahep

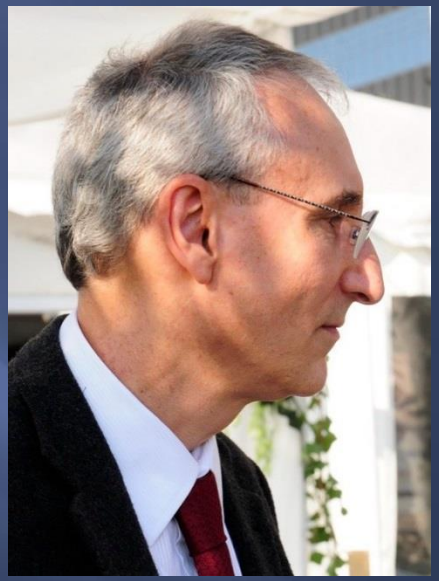
DIANA/HEP Cincinnati

Eduardo Rodrigues, Mike Sokoloff

DIANA/HEP Advisory Board Meeting 26 Jan. 2017

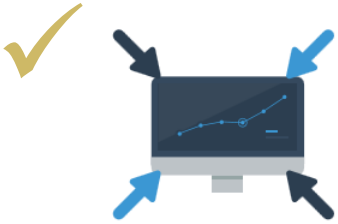
Cincinnati team – both physicists

Eduardo Rodrigues



Mike Sokoloff

Projects – focus on / relevant to



Collaborative Analyses

Establish infrastructure for a higher-level of collaborative analysis, building on the successful patterns used for the Higgs boson discovery and enabling a deeper communication between the theoretical community and the experimental community

Reproducible Analyses

Streamline efforts associated to reproducibility, analysis preservation, and data preservation by making these native concepts in the tools

Interoperability

Improve the interoperability of HEP tools with the larger scientific software ecosystem, incorporating best practices and algorithms from other disciplines into HEP

Faster Processing

Increase the CPU and IO performance needed to reduce the iteration time so crucial to exploring new ideas

Better Software

Develop software to effectively exploit emerging many- and multi-core hardware.
Promote the concept of software as a research product.

Training

Provide training for students in all of our core research topics.

Projects – Ostap

- Ostap project = Python package from Vanya Belyaev (LHCb) started ~ 2009
- Had been up to now directly coupled to LHCb and Gaudi software (Gaudi = "LHC" software framework)

- Mainly Python code but contains also C++ classes for core part (e.g. for speed)
- It expands ROOT "decorating" many objects and expanding functionality

- Summer 2016: idea to "port Ostap out", to make it a project independent of LHCb & Gaudi, i.e. usable by everyone
- Working/collaborating with Vanya & Sasha Mazurov

- Idea is to integrate Ostap in much bigger and potentially high-impact project …
  … Scikit-HEP …

Interoperability

Collaboration

Reproducibility

Projects – Scikit-HEP

- Community-driven and community-oriented project
- Aims to provide Particle Physics at large
  with a Python package containing core and common tools
  - Many similarities with Astropy
- Bridge/glue between ROOT and Python scientific ecosystem
  - Expand typical toolkit of HEP physicists
  - Common definitions and APIs to ease “cross-talk”
- Build core bringing together Ostap, rootpy and root_numpy together, as a starting point
- Bring in other packages & ideas
  - Either to core package or as an affiliated package
    with common API, rules and standards

Interoperability

Collaboration

Reproducibility

Homepage http://scikit-hep.org

GitHub https://github.com/scikit-hep/scikit-hep

Projects – Scikit-HEP

Pillars

- Datasets: data in various sources, such as ROOT, Numpy/Pandas, databases, wrapped in a common interface
- Aggregations: e.g. histograms that summarize or project a dataset
- Modelling: data models and fitting utilities
- Visualization: interface to graphics engines such as ROOT and Matplotlib
- Simulation: utilities, wrappers for Monte Carlo engines and other generators of simulated data

Others

- Maths and statistics tools (exploit what is available out there already)
- Units and constants modules

Affiliated packages

- Take nice concept from Astropy of an affiliated package
- Allows expansion of toolkit avoiding a gigantic do-everything package
- Profit also from other DIANA software projects/products

Collaboration

Within DIANA

- On Scikit-HEP – Jim Pivarski & David Lange (Princeton)

Outside DIANA

- On Scikit-HEP – Vanya Belyaev (ITEP) & Sasha Mazurov (Birmingham), Noel Dawe (Melbourne)
- On Ostap – Vanya Belyaev (ITEP) & Sasha Mazurov (Birmingham)

Plans

Next 6 months

- Work towards a beta release of Scikit-HEP
  - It will not contain everything, but this 1st step is needed
- Engage with Particle Physics community at large, to attract interest and contributions
  - Several packages already identified as interesting to the project
  - Contact persons identified (or to be identified) from e.g. ROOT team; all LHC experiments; neutrino experiments, ongoing and planned; FCC community; simulation community

On the timescale of a year

- First release of Scikit-HEP
- Continue engaging with Particle Physics community
  - E.g. bring in interesting ideas/projects, new collaborators
- Make Scikit-HEP a central analysis tool, i.e. a success
- Promote Scikit-HEP + training, training & training
  - Within LHC experiments *and* others

Interoperability

Collaboration

Reproducibility

Training