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 with 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 I/O 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 …
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

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
**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