Contact person: Lorenzo Cazon cazon@lip.pt (www.lip.pt)
DRAFT 7: This document is not yet final. It is open to suggestions from all of the actors involved.

"An event that shows the potential and synergies of high-energy physics and astroparticle physics in the highly demanded field of Data Science in the modern society, and creates links with the industry."

Data Science in (Astro)Particle Physics And the bridge to industry

12-13-14 and 15-16 March 2018

1. Intro/Abstract

Data Scientist is one of the most sought-after jobs of the moment. Social Networks, Large Retail companies, Pharmaceutical, consulting and telecommunication companies, all the Fortune 500 companies are hiring Data Scientists. Everywhere, everyone. Data Science is the art of analyzing data sets to find correlations, causal relations, patterns; build hypothesis, assign significances to them, asses the efficiency of an algorithm of finding a signal probability of false positives, assess the efficiencies of finding a signal. Define control samples, simulate and replicate the reality according to a model. Access, store, retrieve data, moderate or extremely large data-sets (Big Data); create automatic tools that take decisions,..... Data analysis within high energy physics and astroparticle physics is Data Science. The idea is to create an event (a school with a workshop at the end) to show to students, PhDs and open to young post-docs that coming to fundamental physics is an career opportunity with huge synergies with the job market and the needs of modern society. This event would be made of a school with courses on data science currently used in HEP (High Energy Physics) and astroparticle physics and a workshop/mini-symposium where different companies present their current trends, needs and daily work related to Data Science.

This event also intends to find interlocutors for establishing communication channels with the industry that allow to explore partnerships and joint projects, to compete for international grants, and also to show the capabilities of LIP and (Astro)Particle Physics in general in the field of Data Science. This event will facilitate bringing together the two sides and create the framework to enlarge mutual knowledge of daily work, allowing to create practical synergies from Data Science in fundamental physics into Data Science in industry.

2. School *“Data Science in (Astro)Particle Physics”*

12-13-14 March 2018

Lectures: (two lectures per morning, distributed along the 3 mornings)

1.-Probability & Statistics
2.-Classical Tools (such as Statistical tests, BDS, etc and also examples of real life applications)
3.-Machine Learning

(1 & 2 might be grouped in a single course)

Lecturers are being contacted, waiting for confirmation.

Hands on, learn by doing: Afternoons

3 Workshop *"Data Science in the industry"*

15-16 March 2018

The workshop will be organized as a series of 30 min talks with time for questions at the end. There will be time for informal discussions in coffee-breaks.

The goal is to have a diversified sample of cases where Data Science is key in modern society outside fundamental science. (Some of the speakers might be former scientists who shifted their career from fundamental research at some point). An example of a talk would be to introduce company, the general goals, and then techniques and knowledge related to Data Science/Analysis they use, with real examples. (This is just a guideline, speakers have full freedom for the contents and organization of the talk).

Four topic areas were defined to group the talks by companies, although **it is insisted that this does not prevent or impose any constraint in the contents of the talk or contribution,** but it is just a *intentionally vague* eye guide to follow some pattern, as Data Science is a horizontal domain across all contributions and companies.

Among the companies presentations, there will be four LIP contributions to present the Data Science of LIP in the same format as the companies.

	Thursday	**Friday**
Morning	**A)** Focus on **Technology**	**C)** Focus on **Data Analysis**
	● LIP-talk: DS in Detectors, Space, Medicine ● Company-talk: ● Company-talk: ● ...	● LIP-talk: DS in Astroparticle Physics ● Company-talk: ● Company-talk: ● ...
Afternoon	**B)** Focus on **Machine Learning**	**D)** Focus on **Information Technologies**
	● LIP-talk: DS in Particle Physics ● Company-talk: ● Company-talk: ● ...	● LIP-talk: Computing & IT ● Company-talk: ● Company-talk: ● ...

A list of confirmed companies is handled in a different document.

4. Exploration of LIP-Industry partnerships and joint projects

The School-Workshop wants to serve as seed for a permanent communication channel of LIP as a partner for joint projects, as for instance:

- Education and training in data science at LIP
- Trainee programs LIP, LIP/Industry
- Data analysis, data mining and knowledge building at LIP
- Simulations at LIP
- Computing
- Design of Data acquisition
- Quality control on physical processes
- Others

The event might hold **round tables for open discussions**, or **bilateral meetings with interlocutors from companies**, or have **specific presentations at the school/workshop showing LIP capabilities**. Once the connections are created, and possible synergies are identified there should be further iterations with a **format to be defined** out of the scope of the school & workshop**.**

4. Organization & Logistics

1. Expected attendance

School: ~30
Workshop: ~80 (if registrations exceed this number, change of auditorium will be explored)
Announcement of the event, and specially the workshop) will be announced in different departments of universities.

2. Venue

School: LIP-facilities, LIP seminar and public rooms.
Workshop: LIP-Lisbon Auditorium (Free) Max capacity 80

3. Sponsorship

Sponsorship is ~500€. The logos of sponsors will be included in the official web, poster and all the other media/printed announcements of the event giving them high visibility.

All the participating companies will be also listed in the agenda.

4. Tables with company info

Companies can bring swag/poster/banner, flyers or other material of the company to be placed at the entrance of the auditorium.