Workshop on Advanced Statistics for Physics Discovery
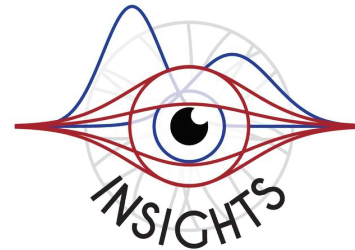
`aspd.stat.unipd.it`

Department of Statistical Sciences, University of Padova, 24-25 Sep 2018

Introductory Remarks on INSIGHTS
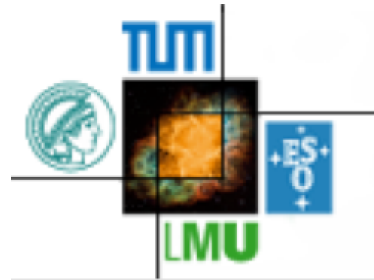
Glen Cowan
RHUL Physics / INSIGHTS Sci. Coord.

INSIGHTS host institutions

INSIGHTS Partners

ESR hosts institutes:
CH: CERN (GE)
DE: MPP (MU)
IT: INFN (NA, PD),
 PANGEA (RM),
 UNINA (NA)
NL: NIKHEF (AM)
NO: UIO (OS)
SE: LUND (LU)
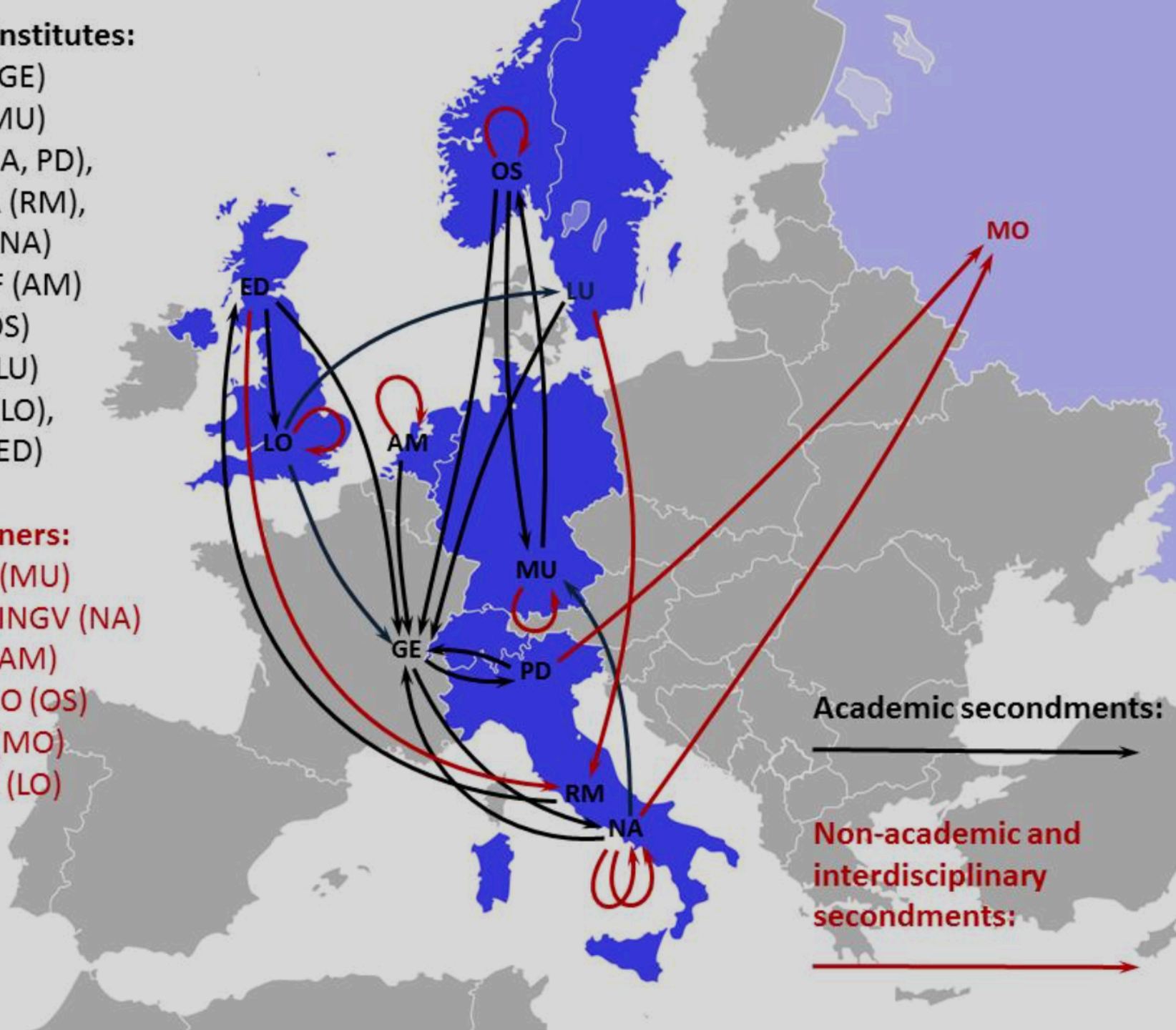**UK:** RHUL (LO),
 UNIED (ED)

Other partners:
DE: C2PAP (MU)
IT: DCOM, INGV (NA)
NL: KPMG (AM)
NO: CICERO (OS)
RU: YNDX (MO)
UK: FISCAL (LO)

Academic secondments:

Non-academic and interdisciplinary secondments:

Our Mission

The INSIGHTS Innovative Training Network will develop advanced statistical methods, implement them in software, and apply them to solve problems in Particle Physics and other fields.

In doing so, we will create the next generation of experts not only able to investigate Nature's fundamental particles but also to solve problems of broad relevance to society.

Key aspects:

PhD from host institution

Training Events

Secondments at partner nodes

Statistics for Particle Physics, Industry and Society
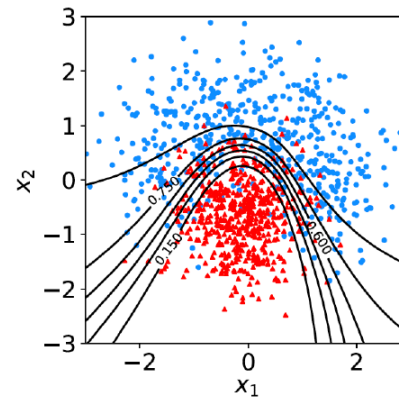
Extra Slides

WP1 Statistical Methods

Coordinator: Allen Caldwell, MPI Munich

Statistical modeling

$$P(\mathbf{x}, \mathbf{y}, \ldots | \boldsymbol{\mu}, \boldsymbol{\theta}, \ldots) = \ldots$$

Multivariate analysis

Bayesian computation

$$P(\lambda | \text{Data}, M) = \frac{P(\text{Data} | \lambda, M) P_0(\lambda | M)}{P(\text{Data} | M)}$$

WP2 Software Tools

Coordinator: Wouter Verkerke, NIKHEF

Modular and efficient software implementation of the statistical techniques developed in the Network will be used to integrate the methods into the general data analysis frameworks:
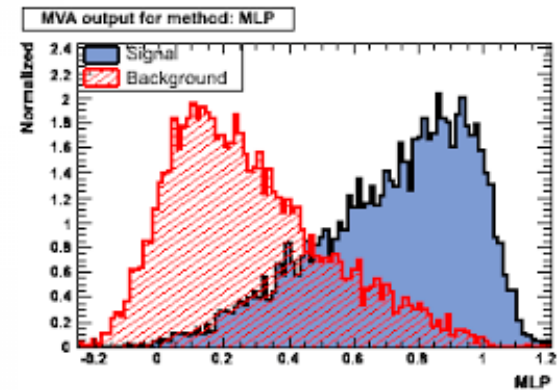
ROOT

TMVA

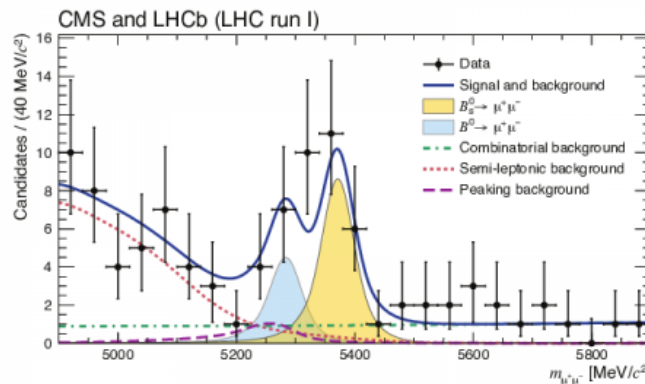RooFit/RooStats

BAT

GAMBIT

WP3 Physics Applications

Coordinator – Alex Read, University of Oslo

Goal is not to develop statistical tools "in a vacuum" but to ensure they an cope with the real-world complexities of actual analyses.

Physics applications include:

LHC Physics (ATLAS and CMS)

Top and Higgs physics, search for new processes

Neutrino physics (SHiP)

Double Beta Decay (GERDA)

WP4 Statistics for Society

Coordinator: Paolo Agnoli, Pangea Formazione (Rome)

Statistics in HEP to/from our partners in research and industry:

Volcanology (INGV)

Climate Science (CICERO)

Finance (KPMG, FISCAL)

Image recognition, traffic flow (Pangea Formazione)

Image Processing (Digital Comoedia)

WP5 Management

Coordinator: Glen Cowan, RHUL

WP6 Training

Coordinator: Luca Lista, INFN Naples

Built on existing events as well as several new created by INSIGHTS, e.g., Pan-European School of Advanced Statistics at DESY

Main Training Events & Conferences	Lead Institution	Project Month (*estimated*)	Duration	Notes
DESY Terascale Statistics School 2018	DESY	7	1 week	
C++/ROOT Tutorial and Introductory workshop on statistical methods (including Scientific Misconduct, Research Integrity training, Ethics training and Open Science including Open data and Data Management Plan)	CERN	10	2 weeks	New ITN Event
NIKHEF C++ and Statistics week 2018	NIKHEF	14	1 weeks	
First Pan-European School of Advanced Statistics	DESY	18	1 weeks	New ITN Event
DESY Terascale Statistics School 2019	DESY	20	1 week	
INFN Statistics School 2019	INFN	21	1 week	
Workshop on non-academic training	UIO	22	1 week	New ITN Event
MPP Excellence School 2019	MPP	25	1 week	
RHUL Soft-skill Training Event (including Media and Writing skill training)	RHUL	27	1 week	New ITN Event
DESY Terascale Statistics School 2020	DESY	32	1 week	
Career Event at MPP	MPP	34	1 week	New ITN Event
MPP Excellence School 2020 and	MPP	37	1 week	
Second Pan-European School of Advanced Statistics	DESY	47	1 weeks	New ITN Event

WP7 Outreach

Coordinator: Tommaso Dorigo, INFN Padova

Web: `insights-itn.eu` → social media, blog, etc.

Outreach workshop (Wednesday!):