The Romanian ATLAS Cluster main activities during 2013:

- **Physics**: SUSY searches and software tools maintenance and development, general search, $W' - G(221)$, jet calibration and resolution

- Tile calorimeter: LS1 activities, Tile Data Quality Leader (DQL) shifts

- TDAQ: Message Transfer System, Access Manager Roles Manager, ATLAS DAQ Efficiency, Checklist tool, Training

- Data analysis and processing infrastructures: maintenance and operation of RO-02-NIPNE and RO-14-ITIM, local analysis facility development - BAAF Tier3 with GRID services

- Upgrade: NSW (New Small Wheels), TDAQ, Tilecal (consolidation)

- Outreach: Iasi, Bucharest and Timisoara

- Technology transfer: Scalable Readout System (HEPTech)
Dear colleagues,

We are sure we speak for the entire collaboration in offering our heartfelt congratulations to Professors François Englert and Peter Higgs on the award of the Nobel Prize in Physics 2013 "for the theoretical discovery of a mechanism that contributes to our understanding of the origin of mass of subatomic particles, and which recently was confirmed through the discovery of the predicted fundamental particle, by the ATLAS and CMS experiments at CERN's Large Hadron Collider."

Last year's discovery was the culmination of the decades of dedicated and intense work by so many collaborators in designing, building and operating ATLAS, and in understanding and analysing the data. None of it would have been possible without the huge dedication also of the LHC accelerator team, the worldwide distributed computing teams, and the continuing support of the governments and funding agencies of the 38 countries home to our 177 member institutes.

We can all feel proud that our experimental observations demonstrated that the insights rewarded by the prize are realised in nature.

Spokesperson: Dave Charlton, Deputy Spokespersons: Beate Heinemann, Thorsten Wengler
Technical Coordinator: Beniamino Di Girolamo, Resources Coordinator: Fido Dittus
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2 SUSY Signals

3 Data and MC Samples

4 Object definitions

5 Trigger studies

6 Event Selection

7 Background estimate

8 Systematic Uncertainties

9 Simultaneous fit method

10 Results

11 Interpretations

12 Summary and conclusion

Appendices

Not reviewed, for internal circulation only

Introduction

Notes to the reader

High priority models

Low priority models

Data

Monte Carlo Simulation

Background samples

Signal samples

Leptons

Jets

Missing Transverse Energy ($E_T^{miss}$)

Jet energy reweighting

Event pre-selection: inclusive di-lepton samples

Signal region definition

Optimization strategy

Result: retained signal regions

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Data

Monte Carlo

Backgrounds with prompt same-sign leptons

Charge mis-measured leptons

Fake lepton background

Real lepton efficiency

Fake lepton efficiency

Validation of the data-driven background estimates

Validation of background estimates with 3 $b$-jets

Jet Energy Scale

Jet Energy Resolution

B-Tagging

Electron and Muon Energy Scale, Resolution, and Selection Efficiencies

Missing Energy

Simulation of Pile-Up

Luminosity

Trigger Efficiency

Theory Systematics on Backgrounds

Uncertainties on MC signal samples

Model-independent upper limits

Model-dependent limits for high-priority grids

Simplified model G(221)

Gluino-stop model I and II

Direct stop model

Strong production 2-step decays via gauginos

Strong production 2-step decays with sleptons

Higgs-aware mSUGRA/cMSSM model

Model-dependent limits for low-priority grids

G(221) model

Gluino-stop model III ($\tilde{g}\rightarrow t\tilde{t}^c$)

Direct stop model

Strong production 1-step decay

RPV model

Samples used for analysis

Preliminary limits with toys

Signal Regions considered for the optimization

Details on trigger studies

Performance of single and dilepton triggers

Studies of trigger strategies

Trigger scale factors for lepton triggers

Additional kinematic distributions

Charge flip rate using the likelihood method

Likelihood method

Systematics on the likelihood method

Raw RooFit results

Optimization of shape fits in...
Tile calorimeter (LS1)

- Production and delivery to CERN of 2 new Long Baskets (LB) - tools for super-drawers manipulation

- After the tests and certification of LB was made a procedure of the extraction/insertion of a super-drawer
  (http://atlas.web.cern.ch/Atlas/SUB_DETECTORS/TILE/Maintenance/Long_Basket.mp4);

- Front end electronics spares: 2650 pieces. G10 Collars produced at Cluj and delivered at CERN (February 2013)

- Tile Calorimeter detector hardware repairs in the ATLAS cavern: Super-Drawers maintenance, installation new version
  of fLVPS, services etc.)

- 1 maintenance Romanian team (1 eng+1 tech), 2 months (April-May): 17 SD opened and repaired; fixed up the power
  supplies for Hardware test benches (Moby Dick)
TDAQ

Message Transfer System
- Transport, filtering and routing of the messages reported with the Error Reporting Service
- Replace Message Reporting System during LS1
  M. Caprini, A. Kazarov - "Message Transport System High-Level Design" https://its.cern.ch/jira/secure/attachment/11448/HLD_draft_v0.2.pdf

Access Manager Roles Manager
- Provide the means to manage the roles (define roles, assign or enable roles, query the assigned/enabled roles for users, grant or deny roles to users, deal with automatic expiration of roles).
- A prototype started to be developed in Bucharest, using a ATLAS Point 1 LDAQ server replication
  M. Caprini, M. Cuciuc, G. Lehmann Miotto - Access Manager Roles Manager Requirements https://its.cern.ch/jira/secure/attachment/11901/AMRM_URD_v0.1.pdf

ATLAS DAQ Efficiency

Checklist tool
- New package for the checklist tool used in ATLAS Control Room
- A prototype version installed at CERN

Training: Updates for new Run Control (release tdaq-05-00-01)
BAAF - Tier3g for Bucharest ATLAS group

- Hardware overview:
  - 1 Master node - with 8 cores and 7 TB storage
    - configured as grid and local cluster user interface
    - CVMFS for ATLAS software and tools
    - configured as master node of the PoD (PROOF on Demand) cluster (for analysis)
    - manager of the Torque/PBS cluster; submitting and scheduling jobs (for simulations and PoD)
    - configured to store data via xrootd
  - 4 Slave nodes Dell PowerEdge M915 blade server with:
    - 64 cores, 128 GB RAM, 1.8 TB HDD, 40 Gbps Ethernet (1.6 oversubscription)
  - Network - 10 Gbps in a private network; only the master node can be accessed from outside
  - Storage: 70 TB on grid SE (LOCALGROUPDISK token)
  - Monitoring the cluster with Nagios

Successful story, heavy used locally by PhD students and SUSY local group

New more 48 cores and 40 TB storage (by the end of year)

Data analysis and processing infrastructures: maintenance and operation of RO-02-NIPNE Tier2 site, local analysis facility development - Tier3 with GRID services / Grid team: G. Stoica, M. Ciubancan, M. Renda

- Monitoring development using Nagios check_MK

- RO-02-NIPNE & BAAF Network

- Storage Area Network (private IPs)
  - c5k-atlas-storage Nexus 5010
  - Storage: 70 TB on grid SE (LOCALGROUPDISK token)
  - Monitoring the cluster with Nagios check_MK
  - Successful story, heavy used locally by PhD students and SUSY local group
  - New more 48 cores and 40 TB storage (by the end of year)

RO-02-NIPNE Tier2 Grid site

- 2 Computing Elements:
  - CREAM1 - dedicated to ATLAS production: 68 slots
  - CREAM2 - dedicated to ATLAS analysis: 200 slots
  - SE: glite-SE_dpm_mysql, 3 dpm_disks serving both RO-02 and BAAF; 248 TB of storage, 146 TB DATADISK, 6 TB PRODDISK, 5 TB SCRATCHDISK, 70 TB LOCALGROUPDISK
  - Worker nodes:
    - 4 and 8 cores WNs- with 20GB/core HDD and 2 GB/core, 1 & 10 Gbps network
    - SL5-x86_64; SL6-x86_64 by the end of year
  - site-BDII, perfSONAR (bandwidth and latency) and Nagios monitoring, SQUID server for ATLAS-frontier & CVMFS
  - outgoing network connectivity 10 Gbps
upgrade (details in the upgrade session):

- NSW (New Small Wheel)
  - MM companion chip, design and production of the 3 prototype bunches
  - MM trigger processor - ATCA SRS (scalable readout system) as candidate

TDAQ
- Level-1 Muon Trigger: NSW Trigger Processor
- Technical Design Report for the Phase-I Upgrade of the ATLAS TDAQ System (Version Draft 3.7),
  TDAQ Upgrade TDR reader for chapter "Online and HLT Software" (M. Caprini)
- Bucharest - participating institute at DAQ/HLT: Online and HLT Software,
  Configuration & Control

Tilecal (consolidation)
"Demonstrator" project - design and development of the mini-drawers mechanics and manipulating tools
outreach: Iasi and Bucharest, Timisoara

ATLAS Outreach

September 2013

- 26 Sep  ATLAS Outreach - Aula Magna, Bucharest University
- 12 Sep  ATLAS Outreach - Meeting with physics teachers, Bucuresti, Colegiul National Mihai Viteazu

May 2013

- 30 May  ATLAS Outreach - Bucuresti, Colegiul National Mihai Viteazu

April 2013

- 25 Apr  ATLAS Outreach - Radio Bucuresti fm

March 2013

- 08 Mar  International MasterClasses - Iasi, Colegiul National
- 07 Mar  ATLAS outreach - Radio Iasi
- 07 Mar  ATLAS outreach - Iasi, Liceul de Informatica
- 07 Mar  ATLAS Experiment at the LHC - Iasi, Univ. Al. Ioan Cuza

ATLAS Romania annual meetings

October 2013

- 17 Oct - 18 Oct  ATLAS Romania - annual meeting (protected)

October 2012

- 23 Oct  ATLAS Romania - annual meeting (protected)
AGREEMENT FOR EXPLOITATION
OF JOINTLY OWNED INTELLECTUAL PROPERTY

Kxxxx/TT/AB/xxxx

Between:

UPV Valencia – Universidad Politécnica de Valencia, Spain
IFIN-HH – Institutul Național de Fizică și Inginerie Nucleară Horia Hulubei, Romania
CERN - European Organization for Nuclear Research, Switzerland
ATLAS Week 16-20 June 2014
in Sibiu/Hermannstadt, România