

Curriculum Vitae

Personal Data

Martino Gagliardi

Born 17/04/1980 in Torino, Italy

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Position

Post-doc research fellowship holder c/o Università degli Studi di Torino since November, 2007

Joint INFN-CERN fellowship holder since September, 2008

Present responsibilities

Deputy System Run Coordinator of the ALICE muon trigger.

Co-responsible (with Frédéric Jouve) of the Detector Control System of the ALICE muon trigger detectors.

Studies

November 2007 Ph. D. in Physics c/o *Facoltà di Scienze Matematiche, Fisiche e Naturali dell'Università degli Studi di Torino*. The title of the final thesis is: *The ALICE muon spectrometer: trigger detectors and quarkonia detection in p-p collisions*¹. Thesis director: Prof. E. Vercellin; thesis referee: Dr. Hervé Borel

July 2004 Master of Science in Physics of Fundamental Interactions c/o *Facoltà di Scienze Matematiche, Fisiche e Naturali dell'Università degli Studi di Torino*, with a mark of 110/110 *cum laude*. The title of the final thesis is: *Sviluppo di RPC e loro applicazioni per muoni e neutroni termici (Development of Resistive Plate Chambers and their application to the detection of muons and thermal neutrons)*.

Jan - Jul 2003 Works as an exchange student (ERASMUS) c/o *Technische Universiteit Eindhoven (NL)*. His work (*Alignment and optimisation for the Eindhoven Microprobe*) is considered 'excellent' and rated with a mark of 9/10.

July 2002 Bachelor in Physics c/o *Facoltà di Scienze Matematiche, Fisiche e Naturali dell'Università degli Studi di Torino*, with a mark of 110/110 *cum laude and a Mention of Honour*.

¹The Ph. D. thesis can be viewed online at <https://twiki.cern.ch/twiki/bin/view/ALICE/PWG3PhDTheses>

July 1999

'Diploma di maturità classica a indirizzo europeo' (A Europe-oriented classical high school level diploma) c/o *Liceo Classico Europeo annesso Conv. Naz. Umberto I*, Turin, with a mark of 100/100.

Research activity

Research within the ALICE experiment at the LHC

My research activity in ALICE was carried out as a member of one of the two ALICE teams of the University and INFN of Torino. Such group is involved in two ALICE subdetectors: the Resistive Plate Chambers (RPC) for the trigger system of the muon spectrometer and the Zero Degree Calorimeter (ZDC), whose main task will be to provide a centrality trigger for the experiment. Besides the detector activity, I have also been involved in physics studies within the ALICE Physics Working Group 3 (Heavy Flavours and Quarkonia) and in the ALICE Detector Control System (DCS).

A more detailed description of these activities is given below.

- **RPCs for the trigger system of the muon spectrometer:** the trigger for the ALICE muon spectrometer will be issued by 72 RPCs, arranged in two stations of two detection planes each. The aim of the system is to provide (di)muon triggers with a 1(2) GeV p_T -cut, to optimise the signal to background ratio for the study of charmonium (bottomonium) states. The parameters of the RPCs have been optimised for operation in the high multiplicity environment expected in heavy ion collisions. The detectors will be operated in streamer mode during heavy ion data-taking.

About 125 detectors have been assembled in Torino. I have been in charge of the complete testing (including the development of the data analysis code) and characterisation of the detectors of the final production before installation in ALICE. The tests allowed the collaboration to select the 72 final detectors and a number of spares. The selection was made on the basis of efficiency (absolute value and uniformity throughout the active surface), dark rate and absorbed current. The tests were the subject of the hardware part of my Ph.D. thesis

I have also taken part in R & D activities (ageing tests) with the aim of developing a highly saturated avalanche gas mixture to be used for data-taking in p-p collisions, in order to reduce the ageing of the ALICE RPCs.

Once the detectors have been installed in the ALICE cavern, I have been fully involved in the on-site commissioning phase: this includes data-taking in four cosmic campaigns, which allowed to verify the performance of the detectors and the smooth operation of the whole trigger system (detector, DAQ, DCS).

Since September, 2008, I have been based at CERN, where I serve as Deputy System Run Coordinator, providing constant support for

the operation of the detectors and interface with the ALICE Run and Technical Coordination.

- **Zero Degree Calorimeters:** the centrality of heavy ion collisions will be measured in ALICE by four ZDCs, two for neutrons (ZN) and two for protons (ZP). These measure the energy of spectator nucleons, which induce a hadronic shower in the calorimeter's dense material: the Cherenkov light produced by fast particles in the shower is detected by means of embedded quartz fibres. Besides the measurement of centrality, the ZDCs can provide other observables such as the reaction plane and the luminosity.

I have taken part in the testing of the ZDCs at the SPS with hadron, electron and positron beams. These allowed to characterise the detectors by measuring, among the rest, the e/h ratio and the resolution as a function of energy. The resolution, extrapolated at LHC energies, was found to be as good as 11% for ZN and 13% for ZP, comparable with the fluctuations in the number of spectator nucleons.

- **Physics performance of the ALICE muon spectrometer:** in the frame of the Physics Working Group 3 (Heavy flavours and Quarkonia), I have been working on the physics performance of the ALICE muon spectrometer for the detection of quarkonia in p-p collisions.

In particular, I have studied the issue of determining quarkonia cross sections at $\sqrt{s}=5.5$ TeV (i.e. the c.m. energy per nucleon pair in Pb-Pb collisions). The knowledge of such values is crucial for the correct normalisation of Pb-Pb data in quarkonia suppression studies. Within the frame of the ALICE analysis tool AliROOT, and assuming parametrisations given by NLO Colour Evaporation Model, I have estimated the accuracy with which the measurements could be done in one month of p-p data-taking at $\sqrt{s}=5.5$ TeV. Since it is not yet known if such a run will be available, I have also studied strategies for rescaling p-p data taken at 14 TeV down to an energy of 5.5 TeV, evaluating the systematics uncertainties arising from the choice of the parton distribution functions and factorisation scale in the calculation. Such works are part of the ALICE Physics Performance Report and of the European Community DIMUONnet project (6th Framework Programme); they can be also found in my Ph.D. thesis.

- **Detector Control System:** since February, 2008 I am (co-)responsible of the DCS for the ALICE muon trigger. I am in charge of the development and maintenance of the system. Based on the PVSS software, the DCS provides tools for the remote monitoring and configuration of detector parameters, and prompt alert in case of errors; it is developed in close co-operation with the central ALICE DCS team and within its guidelines. Among other tasks, I have been in charge of the full development of the control system for the low voltage power supplies which provide external thresholds to the RPC front-end electronics. Such

a system will allow the collaboration to switch quickly and remotely from the streamer to the avalanche operation mode and vice-versa.

Other research activities

- Development and testing of RPCs for thermal neutron detection, including the test of a prototype at the GELINA neutron facility in Geel (BE);
- Study of a cosmic muon tomography system with RPCs: both hardware (prototype) and software (algorithm and simulation) development.
- Optimisation of the ion beam optics of a 1,5 MeV linear accelerator for research on elemental analysis, ion beam lithography and adrotherapy (work carried out as an undergraduate student at the Technische Universiteit Einhdhoven).

Teaching

- 2008** Teaching assistant in the Physics courses of the Mathematics curriculum of the *Facoltà di Scienze Matematiche, Fisiche e Naturali dell'Università degli Studi di Torino*
- 2006-2007** Teaching assistant in the Physics courses of the Chemistry and Industrial Chemistry curricula of the *Facoltà di Scienze Matematiche, Fisiche e Naturali dell'Università degli Studi di Torino*

Publications

- R. Arnaldi et al., *RPC as a thermal neutron detector*, IOP Journal of Physics: Conference Series, vol. 41 (2006), pp. 384-390.
- R. Arnaldi et al., *Test beam results on the proton Zero Degree Calorimeter for the ALICE experiment*, in *XII International Conference on Calorimetry in High Energy Physics*, 2006 American Institute of Physics 978-0-7354-0364-2/06, pp. 415-422.
- R. Arnaldi et al., *Design and Performance of the ALICE muon trigger system*, Nuclear Physics B (Proc. Suppl.), vol. 158 (2006), pp. 21-24.
- R. Arnaldi et al., *Overview on production and first results of the tests on the RPCs for the ALICE dimuon trigger*, Nuclear Physics B (Proc. Suppl.), vol. 158 (2006), pp. 83-86.
- R. Arnaldi et al., *Beam and ageing tests with a highly-saturated avalanche gas mixture for the ALICE p-p data taking*, Nuclear Physics B (Proc. Suppl.), vol. 158 (2006), pp. 149-153.
- R. Arnaldi et al., *Neutron detection with Resistive Plate Chambers via the $^{10}\text{B}(n,\alpha)^7\text{Li}$ reaction*, Nuclear Physics B (Proc. Suppl.), vol. 158 (2006), pp. 177-181.

- B. Alessandro et al. [ALICE Collaboration], *ALICE: Physics performance report, volume II*, Journal of Physics G 32 (2006), pp. 1295-2040.
- N. De Marco et al., *Performance of the Zero Degree Calorimeters for the ALICE experiment*, IEEE Trans. on Nucl. Sc., vol. 54 (2007), no. 3, pp. 567-573.
- G. Puddu et al., *The Zero Degree Calorimeters for the ALICE experiment*, Nuclear Instruments and Methods in Physics Research A 581 (2007), pp. 397-401.
- A. De Falco et al., *Zero degree Cherenkov calorimeters for the ALICE experiment*, Nucl. Instr. and Meth. A 595 (2008), pp. 267-269.
- K. Aamodt et al. [ALICE Collaboration], *The ALICE experiment at the CERN LHC*, Journal of Instrumentation 3 (2008), S08002
- R. Arnaldi et al., *Final results of the tests on the resistive plate chambers for the ALICE muon arm*, Nucl. Instr. and Meth. A 602 (2009), pp. 740-743
- R. Arnaldi et al., *Commissioning and calibration of the Zero Degree Calorimeters for the ALICE experiment*, in *XIII International Conference on Calorimetry in High Energy Physics*, IOP Journal of Physics: Conference Series, vol. 160 (2009) 012060

Talks given by M. Gagliardi at workshops and conferences

- RPC tests in Torino*, Workshop on Dimuon Physics in Ion-Ion Collisions, Peterhof (Russia) 6 June 2005,
<http://muonarm.ca.infn.it/afiliat/register/dimu05/dimu05.htm>
- Resistive Plate Chambers per lo spettrometro dimuonico di ALICE*, XCII Congresso SIF, Torino (Italy), 22 September 2006, Atti del XCII Congresso Nazionale Società Italiana di Fisica, p. 199.
- Comparison between pp 14 TeV and PbPb 5.5 TeV: strategy and extrapolation*, The 4th DiMuonNet Workshop, Paris (France), 4 December 2006,
<http://www-dapnia.cea.fr/Sphn/Alice/DiMuonNet/index.html>
- Design and performance of the ALICE Muon Spectrometer*, Workshop on High energy QCD: from RHIC to LHC, ECT*, Trento (Italy), 11 January 2007,
<http://www-spht.cea.fr/Images/Pisp/fgelis/Workshops/Trento2007>
- RPCs for the ALICE Muon Arm*, XLV International Winter Meeting on Nuclear Physics, Bormio (Italy), 15 January 2007, published in the Proceedings Volume.
- Quarkonia detection in p-p collisions at 5.5 TeV with the ALICE muon spectrometer*, International School on Quark-Gluon Plasma and Heavy Ion Collisions: past, present, future, Torino (Italy), 7 February 2007,
<http://www.to.infn.it/qgp/>

Individuazione di materiali ad alto Z mediante radiografia muonica con Resistive Plate Chambers, XCIII Congresso SIF, Pisa (Italy), 27 September 2007, Atti del XCIII Congresso Nazionale Società Italiana di Fisica, p. 133.

Final results of the tests on the RPCs for the ALICE muon arm, IX Workshop on Resistive Plate Chambers and related detectors, Mumbai (India), 14 Feb 2008

<http://www.hecr.tifr.res.in/MaKaC/contributionListDisplay.py?confId=18>

The ALICE muon spectrometer, European Nuclear Physics Conference, Bochum (Germany), 20 Mar 2009

<http://www.dpg-verhandlungen.de/2009/bochum/hk84.pdf>

Posters presented by M. Gagliardi at workshops and conferences

RPC as a thermal neutron detector, VIII Workshop on Resistive Plate Chambers and related detectors, Seoul (South Korea) 10 October 2005, <http://kodel.korea.ac.kr/rpc/>

Talks given by M. Gagliardi at collaboration meetings and workshops

Quarkonia Rates in the Muon Spectrometer in pp at 0.9 TeV, ALICE Physics Working Group 3 Meeting, CERN, 8 November 2006, <http://indico.cern.ch/conferenceDisplay.py?confId=a057583>

Quarkonia cross sections in p-p collisions at $\sqrt{s}=5.5$ TeV, ALICE Physics Working Group 3 Meeting, CERN, 10 December 2007, <http://indico.cern.ch/conferenceDisplay.py?confId=8430>

Results from the commissioning run, ALICE Muon Trigger meeting, CERN, 31 Mar 2008, <http://indico.cern.ch/conferenceDisplay.py?confId=30634>

Muon Trigger: DCS status and planning, The 23th ALICE DCS Workshop, CERN, 27 Oct 2008, <http://indico.cern.ch/conferenceDisplay.py?confId=43666>

More details on trigger detectors and related DCS, ALICE DiMuon meeting, CERN, 28 Oct 2008, <http://indico.cern.ch/conferenceDisplay.py?confId=43670>

Cosmic run status for trigger: performance of RPCs, in streamer and avalanche mode, ALICE DiMuon meeting, CERN, 21 Apr 2009, <http://indico.cern.ch/conferenceDisplay.py?confId=57205>

Languages Italian (native), English, French (high school level), Spanish (beginner level).

Computing skills

Basic knowledge of the following OS's:

- Windows 95/98/NT/2000/XP;

- Linux RedHat/Debian;

Programming languages:

- C++;

L^AT_EX

ROOT and AliROOT

PVSS

VSP protocol for RS232 communication

Martino Gagliardi

Genève, 13 May 2009