

Graduate School in Physics and Astrophysics

-----  
**ANNUAL REPORT**  
-----

**Name:** Marco Musich  
**Email:** [musich@to.infn.it](mailto:musich@to.infn.it)  
**Ciclo:** XXIII  
**Year completed** (1,2 or 3): 3  
**Supervisor:** E. Miglore

-----  
**SUMMER SCHOOLS, INTERNATIONAL SCHOOLS**

**Title:** [XX Giornate di studio sui rivelatori](#)  
**Place:** Villa Gualino - Torino (Italy)  
**Webpage:** <http://www.gsr.unito.it/>  
**Days:** 4 (23-26 February 2010)  
**Talk or poster (Y/N):** No

**Title:** [QCD for postgraduates](#)  
**Place:** CERN - Meyrin (CH)  
**Webpage:** <http://cdsweb.cern.ch/record/1256586>  
**Days:** 5 (12-16 March 2010)  
**Talk or poster (Y/N):** No

**Title:** [1st SAT Residential School "Energy and Sustainability"](#)  
**Place:** Pracatinat - Torino (Italy)  
**Webpage:** //  
**Days:** 3 (31 May- 2 June 2010)  
**Talk or poster (Y/N):** No

**Title:** [PSI Summerschool on Particle Physics - Gearing up for LHC Physics](#)  
**Place:** Zuoz (CH)  
**Webpage:** <http://ltpth.web.psi.ch/zuoz2010/index.htm>  
**Days:** 8 (August 1 - 7, 2010)  
**Talk or poster (Y/N):** No

-----  
**CONFERENCES, WORKSHOP**

**Title:** [CMS Week 7-11/12/2009](#)  
**Place:** CERN - Meyrin (CH)  
**Webpage:** <http://indico.cern.ch/conferenceDisplay.py?confId=73212>  
**Days:** 5 (7-11 December 2009)  
**Talk or poster (Y/N):** No

**Title:** [I Corso di Formazione INFN sul tema dell'energia nucleare](#)  
**Place:** Torino (ITALY)  
**Webpage:** <http://formazione.to.infn.it/2009/energianucleare/index.html>  
**Days:** 2 (14-15 December 2009)  
**Talk or poster (Y/N):** No

**Title:** [XI workshop CMS Italia](#)  
**Place:** Pisa (ITALY)  
**Webpage:** [http://web.infn.it/cms/index.php/documenti/cat\\_view/46-cms-italia/69-pisa-gennaio-2010](http://web.infn.it/cms/index.php/documenti/cat_view/46-cms-italia/69-pisa-gennaio-2010)

Days: 2 (28-29 January 2010)  
Talk or poster (Y/N): No

Title: [CMS Week 14-19/03/2010](#)  
Place: CERN - Meyrin (CH)  
Webpage: <http://indico.cern.ch/conferenceDisplay.py?confId=84487>  
Days: 5 (14-19 March 2010)  
Talk or poster (Y/N): No

Title: [Flavor Physics and CP Violation 2010](#)  
Place: Torino (ITALY)  
Webpage: <http://fpcp2010.to.infn.it/>  
Days: 5 (25-29 May 2010)  
Talk or poster (Y/N): Yes ([Perspectives for Quarkonium Physics in CMS](#))

Title: [CMS Week 12-18/06/2010](#)  
Place: CERN - Meyrin (CH)  
Webpage: <http://indico.cern.ch/conferenceDisplay.py?confId=93205>  
Days: 5 (12-18 June 2010)  
talk or poster (Y/N): No

Title: [XII workshop CMS Italia](#)  
Place: Padova (ITALY)  
Webpage: [http://web.infn.it/cms\\_padova/index.php/cms-italia-padova](http://web.infn.it/cms_padova/index.php/cms-italia-padova)  
Days: 3 (27-29 October 2010)  
Talk or poster (Y/N): No

Title: [Corso di Formazione INFN sui sensori](#)  
Place: Torino (ITALY)  
Webpage: <http://formazione.to.infn.it/2010/sensori/index.html>  
Days: 3 (3-5 November 2010)  
Talk or poster (Y/N): No

---

## VISITS AND STAGES

Institution: CERN  
Place: Meyrin (CH)  
Dstarting date: 1/01/2010  
Days: 20 (through the year)

---

## RESEARCH ACTIVITY

I am carrying out my research activity in high energy physics at the Compact Muon Solenoid (CMS) experiment at the Large Hadron Collider (LHC) in Geneva. In particular the main effort of my work was devoted to the full-scale alignment of the CMS inner silicon Tracker using cosmic ray tracks collected during the CMS global runs in 2008-2009 and collision data coming from collision data collected during the proton-proton LHC run during late 2009 and 2010. I validated alignment results by using several data-driven methods and tested them against predictions with a detailed detector simulation. I have developed and tested on collision data a procedure based on unbiased primary vertices fitting, to assess alignment of the structures of the Pixel Tracker of CMS. I contributed to the first measurement of the total  $pp \rightarrow J/\psi \rightarrow \mu\mu$  production cross-section at  $\sqrt{s} = 7$  TeV the LHC. In particular I focused on

the evaluation of the systematic errors due to the inner tracker residual misalignment to the measurement of the B-hadron fraction of the  $pp \rightarrow J/\psi \rightarrow \mu\mu$  cross section, a physical observable that relies on the separation of prompt di-muons from di-muons coming from heavy particles decay chains. This task needed to determine accurately displaced secondary vertices, a procedure very sensitive to the alignment of inner Tracker and which needs a good knowledge of the detector geometry to achieve the desired resolution.

-----  
**PUBLICATIONS IN THE YEAR**

**Title: Commissioning and performance of the CMS silicon strip tracker with cosmic ray muons.**

Author: The CMS Collaboration

Date: 2010

Journal: J. Inst. 5 T03008

**Title: Transverse-momentum and pseudorapidity distributions of charged hadrons in pp collisions at  $\sqrt{s} = 0.9$  and 2.36 TeV**

Autor: The CMS Collaboration

Date: 2010

Journal: J. High Energy Phys. 02(2010)41

**Title: Measurement of the charge ratio of atmospheric muons with the CMS detector**

Autor: The CMS Collaboration

Date: 2010

Journal: Phys. Lett. B 692 (2010) 83-104

**Title: Transverse-momentum and pseudorapidity distributions of charged hadrons in pp collisions at  $\sqrt{s} = 7$  TeV**

Autor: The CMS Collaboration

Date: 2010

Journal: Phys. Rev. Lett. : 105 (2010)

**Title: Inclusive total and differential production cross section of  $J/\psi$  and b-hadron production in pp collisions at  $\sqrt{s} = 7$  TeV with the CMS experiment**

Autor: N. Adam [...] M. Musich, et al.

Date: 2010

Journal: CMS AN 2010/138

**Title: Prompt and non-prompt  $J/\psi$  production in pp collisions at  $\sqrt{s} = 7$  TeV**

Autor: CMS Collaboration,

Date: 2010

Journal: CERN-PH-EP-2010-046, arXiv:1011.4193

-----

BE AWARE: research activity and Pubs are not evaluated as didactic credits, but are requested to trace the PhD students' career