

CURRICULUM VITAE

MARCO RAMILLI

ADDRESS

Via Giussani, 16
I-22100 Como -CO-
Italy

Phone: +39-031.592027
Office Phone: +39-031.2386142
Office Fax: +39-031.2386209
E-Mail: marco.ramilli@uninsubria.it
Secondary E-Mail: marco.ramilli@gmail.com

PERSONAL DETAILS

Gender: Male
Date of birth: 2nd September, 1979
Place of birth: Forlimpopoli (FC), Italy
Present Citizenship: Italian

EDUCATION

Since 10/2007 Ph.D. Student at the Università dell'Insubria, Como – Italy;
Supervisors: Prof. M. Caccia

04/2007–10/2007 Research grant at Università dell'Insubria di Como - Italy
Title: *Theory and phenomenology of polarization in adronic physics*;

1998–03/2007 Master Degree in Physics at the Università dell'Insubria di
Como - Italy Thesis: *Single-Spin Asymmetries in QCD (in Italian)*; Supervisors: Prof. P. G. Ratcliffe

1993–1998 Diploma di Maturità Scientifica at the Liceo Scientifico *Paolo
Giovio*, Como – Italy
Mark: 60/60

GRADUATION STUDIES CURRICULUM & MASTER DEGREE THESIS SUMMARY

I obtained my Master Degree in Physics in March 2007 with a thesis on single-spin asymmetries of hadronic reactions, focusing on the asymmetry in pion production from a polarized proton beam colliding with an unpolarized proton target. Working with the twist-three completely collinear Partonic Distribution Functions (PDFs) in the soft-gluon approximation, I could identify two dominant partonic sub-processes contributing to the asymmetries. Thus, during the Master Degree thesis I could archive, besides a general knowledge of Quantum Field Theory and Standard Model, a more focused experience on partonic QCD and both analytical and numerical cross-section calculation.

In September 2007, I presented these results in a talk given at the DSPIN-07 Workshop on High Energy Spin Physics, held at the Joint Institute for Nuclear Research (JINR) in Dubna (RU).

PRESENT RESEARCH ACTIVITY

In October 2007 I was admitted to the graduate school at University of Insubria, joining the Experimental Particle Physics group.

The group has a long standing experience in the field of development, characterization and optimisation of both strip and pixel Silicon sensors for particle tracking. In High Energy Physics a significant contribution of the research team can be traced back to the engineering of the DELPHI (Detector with Lepton, Photon and Hadron Identification) experiment vertex detector and luminosity monitor at the LEP (Large Electron Positron Collider) at CERN (European Center for Nuclear Research) in Geneva (Switzerland). Nowadays the group is part of an international research project (EUDET, <http://www.eudet.org/>) for the development of novel detectors for Linear Collider (ILC, <http://www.linearcollider.org/cms/>) sensors and is managing the Italian collaboration for the INFN (Istituto Nazionale di Fisica Nucleare).

In the period lasting from October 2006 until January 2009, the research group coordinated RAPSODI, a project financed for 1.5 million euros by the European Commission - Contract Number COOP 32993. The main goal of RAPSODI was the development of novel devices for the detection of ionizing radiation, based on the use of Silicon Photo Multipliers (SiPM), innovative single photon resolving sensors.

Three were the major foreseen applications: illicit trafficking of radioactive material detection, in vivo dosimetry for mammography and indoor Radon monitoring; the last two passed the prototype phase and are ready to be commercialized by the industrial partners within RAPSODI.

Part of my research activity took place within the RAPSODI project consisted principally in:

- **SiPM characterisation and optimisation** An exhaustive protocol for the SiPM characterisation has been drafted and finalised. It comprises the measurements of SiPM essential parameters: I-V curves, photo detection efficiency, dark count rate, optical cross-talk, gain and their temperature

dependence.

- **Optimization of a coincidence setup for Radon measurements application** Using fully characterized SiPMs, I worked on a coincidence setup meant to be a prototype for a Radon detector, searching the biasing and threshold conditions to optimize the Radon decay detection.

In parallel, my reasearch consisted in the study of possible applications of SiPMs to quantum optics and to the biophysical tecnique of Fluorescence Fluctuation Spectroscopy:

- **Description of the response of a SiPM** Quantum optics physicists proposed a study on the applicability of SiPMs as detectors in reconstructing light fields probability distributions, interested by the single-photon resolution capability of these devices. To properly reconstruct the probability distribution of the detected light fields, I proposed a model of the response of the detectors, in term of probabily distribution of the Geiger-Müller avalanches, taking into account the contribution of dark count rate and optical cross-talk. An extensive data analysis of the acquired light spectra was necessary in order to both elaborate and subsequently validate the model.
- **Application of SiPMs to Photon Counting Histogram technique** Photon Counting Histogram (PCH) is a techinque of Fluorescence Fluctuation Spectroscopy, which measures parameters of biophysical interest of proteins ligated with specific fluorophores in a solution, by measuring the deviation of the fluorescence emission from poissionan distribution. The study of applicability of SiPMs to this kind of measurements required, besides the solid model of SiPM response, an extensive measurement of the time resolution capability of these devices and the elaboration of an optimized and dedicated optical setup. Using the acquired knowledge on SiPM response, I could demonstrate that SiPMs possess the capabilities of perform effective PCH measurements.

RESEARCH INTERESTS

My main research interests cover:

- charcterization of the performances of Silicon Photomultipliers (SiPMs) and consequent application of these devices;
- characterization of the features of semiconductor based sensors;
- detector developement for particle physics, medical physics and quantum optics applications;
- experimental data analysis;
- phenomenological study of spin dependence in QCD processes, in particular the contribution of twist-three parton distribution contribution in polarized hadronic reactions

LANGUAGE KNOWLEDGE

Italian	native
English	excellent

INFORMATICS KNOWLEDGE

Programming languages:	
Fortran	good
C++	good
Analysis tools:	
ROOT	excellent
FORM	good
Office application:	excellent

MOST RELEVANT PUBLICATIONS

1. M. Ramilli, A. Allevi, V. Chmill, M. Bondani, M. Caccia, and A. Andreoni. Photon-number statistics with silicon photomultipliers. *J. Opt. Soc. Am. B*, 27(5):852–862, 2010
2. M. Caccia, A. Bulgheroni, C. Cappellini, V. Chmill, M. Ramilli, and F. Risigo. Response of silicon photo-multipliers to a constant light flux. *Nuclear Physics B - Proceedings Supplements*, 197(1):30 – 34, 2009. 11th Topical Seminar on Innovative Particle and Radiation Detectors (IPRD08)
3. M. Ramilli, M. Bondani, A. Allevi, M. Caccia, A. Andreoni, and V. Chmill. Analysis of the response of silicon photomultipliers to optical light fields. In *9th International Conference on Large Scale Applications and Radiation Hardness of Semiconductor Detectors, PoS(RD09)*, 30 September - 02 October 2009. Florence - Italy
4. M. Ramilli. Characterization of sipm: temperature dependencies. In *Nuclear Science Symposium Conference Record*, 19 - 25 October 2008. Dresden - Germany
5. P. G. Ratcliffe and M. Ramilli. Dominant contribution in pion production single-spin asymmetries. In *XII Advanced Research Workshop on High Energy Spin Physics (DSPIN-07)*, 03-07 September 2007. Dubna - Russia

CONFERENCE TALKS AND POSTERS

1. 2007, September the 3rd;
Dominant Contribution in Pion Production Single-Spin Asymmetries;
XII Advanced Research Workshop on High Energy Spin Physics (DSPIN-07), 03 - 07 September, Dubna, Russia
2. 2008, October the 22nd;
poster session: *Characterization of SiPM: temperature dependencies*;
Nuclear Science Symposium and Medical Imaging Conference, 19 - 25
October, Dresden, Germany
3. 2009, October the 2nd;
Analysis of the Response of Silicon Photomultipliers to Optical Light Fields;
9th International Conference on Large Scale Applications and Radiation
Hardness of Semiconductor Detectors, 30 September - 02 October, Flo-
rence, Italy

REFERENCES

These people are familiar with my professional qualifications and my character:

Prof. Massimo Caccia

Thesis supervisor and PhD cotutor Phone: +39-031.2386216
Via Valleggio, 11 Fax: +39-031.2386209
22100 Como Email: massimo.caccia@uninsubria.it
Italy

Prof. Philip George Ratcliffe

Università dell'Insubria Phone: +39-031.2386231
Via Valleggio, 11 Fax: +39-031.2386119
Como Email: philp.ratcliffe@uninsubria.it Italy

Prof. Alessandra Andreoni

Università dell'Insubria Phone: +39-031.2386210
Via Valleggio, 11 Fax: +39-031.2386119
Como Email: alessandra.andreoni@uninsubria.it
Italy