

Simone Riggi

Curriculum Vitae

Personal information

Name/Surname Simone Riggi
Nationality Italian
Date of birth 4th January 1983, Catania (Italy)
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Education

February 16th 2010 PhD in Physics at the University of Catania, final mark with distinction, thesis title: *Measurement of the cosmic rays mass composition using hybrid data of the Pierre Auger Observatory*
October 11st 2006 Second Level Degree in Physics, final mark 110/110 with distinction, thesis title: *Studio dell'identificazione in massa dei raggi cosmici di altissima energia all'Osservatorio Pierre Auger*
November 29th 2004 First Level Degree in Physics, final mark 110/110 with distinction, thesis title: *Ultra High Energy Cosmic Rays: Anisotropia direzionale e clustering di eventi*
2001 – 2006 Attendance to University studies, Department of Physics and Astronomy, University of Catania
1996 – 2001 High school Diploma, “G.Galilei” High School, Catania, final mark 100/100

Work experiences

01/04/2012 – 01/10/2014 Post-doc fellowship at the INAF Astrophysical Observatory of Catania (Italy)
04/11/2010 – 01/04/2012 Post-doc fellowship at the University of Santiago de Compostela (Spain)
03/03 – 31/10 2010 Post-doc fellowship at the “Centro Siciliano di Fisica Nucleare e di Struttura della Materia” (Italy)
2006–2009 PhD fellowship at the University of Catania (Italy)
2005–2007 Fellowship at the “Istituto Nazionale di Fisica Nucleare” (INFN), Section of Catania (Italy)

Language Skills

Italian Mother tongue
English Good knowledge of oral and written
Spanish Good knowledge of oral and written

Software Skills

Operating Systems Windows, Linux
Programming Languages C/C++, Fortran, Java, Unix Shell programming
Software development and management Subversion (software repository), Doxygen (software documentation), GNU Makefile & CMAKE (software build system), QT (software GUI development)
Data Analysis ROOT, PAW, MATLAB, R, ORIGIN

Simulation	GEANT3, GEANT4 (detector modeling and particle tracking), CORSIKA, CONEX (simulation of cosmic rays in atmosphere), REAS (simulation of cosmic ray radio emission in atmosphere), Auger <u>Offline</u> (simulation and reconstruction of cosmic ray events in the Auger detector), CRPROPA (simulation of cosmic rays in intergalactic environments)
3D data visualization	OpenGL, DAWN, VRML, VISIVO, VTK
Database Management	MySQL, phpMyAdmin
Distributed computing	Software application development and data storage for cluster farms with PBS/LSF/SGE and for GRID enviroment with gLite
Other	LATEX, Microsoft Office tools (Word, Excel, PowerPoint, ...)

Research Activity

High Energy Cosmic Rays S. Riggi is member of the Pierre Auger Observatory from 2007 and of the JEM-EUSO experiment from 2010. Within these contexts, the activities of S. Riggi mainly focused on the following aspects:

- *Mass composition with hybrid data:* S. Riggi collaborated to the development of the mass composition analysis at the Pierre Auger Observatory, in particular the study of the primary particle identification and chemical abundance reconstruction capabilities of the hybrid detector, measurement of the elongation rate and fluctuation in the shower depth of maximum, measurement of the nuclear composition on top of the atmosphere, astrophysical interpretation of combined spectrum and composition results.
- *Inclined air showers:* S. Riggi was involved in the development of physics analysis performed with very inclined air showers measured with the surface detector of the Pierre Auger Observatory. Such activities regarded the study of the achieved reconstruction accuracy and the measurement of the muon content and energy spectrum of inclined events.
- *Design studies for the BATATA muon hodoscope:* S. Riggi was involved in the analysis performed with the muon counter hodoscope prototype (BATATA). His main activities mainly focused on the development of the device simulation, the study of tracking reconstruction and muon identification capabilities.
- *Calibration of fluorescence detector pixels:* S. Riggi contributed to the analysis and monitoring of relative calibration data of the fluorescence detector PMTs of the Pierre Auger Observatory and to the set up of a nightly pixel calibration database, currently used for real data reconstruction. He was also involved in the monitoring of data taking of the fluorescence telescopes.
- *Grid activities:* In this context S. Riggi's activity focused on the porting and testing of the Auger simulation and reconstruction tools in a Grid infrastructure (INFN, COMETA).
- *Uptime of the fluorescence telescopes:* S. Riggi was involved in the study of the Auger fluorescence telescope uptime with minimum bias, T3 and background data.

Muon Tomography S. Riggi is member of the Muon Portal Collaboration from 2012. He collaborated to the R&D studies for a muon tomography prototype for detection of potentially dangerous material in containers. In this context S. Riggi took part in the strip prototype assembly phase and in first laboratory data taking. Within the project S. Riggi's activity focused on the development of an end-to-end GEANT4 simulation of the device and its readout, studies of the optimal design of the scintillator strips and embedded WLS fibers, comparison of the performed simulation with prototype measurements, studies of expected electromagnetic contamination and muon-background identification in the portal, development of suitable tracking reconstruction algorithms and tomography imaging algorithms.

Data analysis techniques S. Riggi's activities focused on the analysis, processing, visualization and storage of massive amounts of data (simulated or real), in different formats (ROOT, sql, ascii, binary, ...), from low-level (detector calibration and monitoring) to high-level (event reconstruction and selection). In such context S. Riggi developed tools for advanced statistical techniques (e.g. multiparametric analysis, neural network, clustering, unfolding, tracking, ...), for graphical visualization of data and simulation models and fast data processing on distributed systems (farms, GRID).

Experimental activities

Radiation detectors Usage of several detector devices (Geiger counters, ionization chambers, plastic and inorganic scintillators, photomultipliers, silicon and germanium detectors) for the measurement of nuclear radiations (gamma, alpha, electrons, cosmic rays, ...)

- Nuclear electronics Usage of electronic modules (oscilloscopes, preamplifiers, amplifiers, discriminators, logic circuits, ADC, TDC, QDC, . . .) and CAMAC acquisition systems for the design of experiments in the field of nuclear and astroparticle physics.
- Other Characterization and simulation of scintillator detectors and optical fibers (clear, WLS) to be used with light-sensitive devices (APD, Silicon PM, PMT).

Teaching experiences

- Co-directed thesis E. Trovato, *Performance study of the muon prototype detector at the Pierre Auger Observatory*, PhD thesis at the University of Catania (2011)
G. De Mauro, *Evidenza della soppressione del flusso di raggi cosmici ad altissima energia all'Osservatorio Pierre Auger*, Master thesis at the University of Catania (2009)
- Teaching Assistant for the General Physics course of the Biological Science degree at the University of Catania during academic years 2006-2009, supervisor Prof. A. Insolia
Assistant for the Laboratory of Physics III course of the Physics degree at the University of Catania during academic year 2006, supervisor Prof. G. Raciti

Work stays abroad

- 2012 Santiago de Compostela (Spain)- "Universidad de Santiago de Compostela": Scientific activity within the Santiago de Compostela Auger group (4 months)
- 2011 Santiago de Compostela (Spain)- "Universidad de Santiago de Compostela": Scientific activity within the Santiago de Compostela Auger group (1 year)
- 2010 Malargüe (Argentina) - "Pierre Auger Observatory": Scientific activity for the Pierre Auger Collaboration (1 month)
Santiago de Compostela (Spain) - "Universidad de Santiago de Compostela": scientific collaboration with the Santiago de Compostela Auger group (1 month)
- 2009 Karlsruhe (Germany) - "Forschungszentrum": scientific collaboration with the Karlsruhe Auger group (4 months)
Malargüe (Argentina) - "Pierre Auger Observatory": Scientific activity for the Pierre Auger Collaboration (1 month)
- 2008 Malargüe (Argentina) - "Pierre Auger Observatory": Scientific activity and attendance at the fluorescence telescope data acquisition of the Pierre Auger Observatory (2 months)
- 2007 Malargüe (Argentina) - "Pierre Auger Observatory": Scientific activities and attendance at the fluorescence telescope data acquisition of the Pierre Auger Observatory (2 months)

Conferences, seminars and training experiences

- 2012 Attendance to the "23rd European Cosmic Ray Symposium", Moscow (Russia), 3-7 July 2012
Attendance to the "Auger Collaboration Meeting", Malargüe (Argentina), 11-16 March 2012
Attendance to the "XII Encontro Lisboa-Compostela", Santiago de Compostela (Spain), 8-10 February 2012
- 2011 Seminar "Current activities in the Pierre Auger Observatory" at the MAPRad Srl Company, Perugia (Italy), 9 August 2011
- 2010 Seminar "Mass composition studies with hybrids" at the Universidad de Santiago de Compostela, Santiago de Compostela (Spain), 17 December 2010
Attendance to the "Cosmic Ray International Seminar CRIS 2010", Catania (Italy), 13 – 17 September 2010
Attendance to the "School on ESAF software for the JEM-EUSO experiment", Torino (Italy), 7 – 10 July 2010
Attendance to the "Auger Collaboration Meeting", Malargüe (Argentina), 6 – 12 March 2010
Seminar "Mass composition results from the Pierre Auger Observatory" at the Laboratori Nazionali del Gran Sasso and scientific collaboration with the L'Aquila Auger group (Italy), 18 – 21 January 2010
- 2009 Attendance to the "XCV Congresso Nazionale della Società Italiana di Fisica", Bari (Italy), 28 September – 3 October 2009
Attendance to the "KASCADE closure symposium", Karlsruhe (Germany), 30 March 2009
Attendance to the "Auger Italy Meeting", Barolo (Italy), 26 – 28 February 2009

- 2008 Attendance to the “Auger Collaboration Meeting”, Malargüe (Argentina), 16 – 21 November 2008
 Attendance to the “Cosmic Ray International Seminar CRIS 2008”, Malfa (Italy), 15 – 19 September 2008
 Attendance to the “Auger Grid Training School”, Cesnet and Institute of Physics, Prague (Czech Rep.), 17 – 19 April 2008
- 2007 Attendance to the “Auger Collaboration Meeting”, Malargüe (Argentina), 12 – 17 November 2007
 Attendance to the “International School on Astroparticle Physics”, Seillac (France), 4 – 15 June 2007
 Attendance to the “XI International Workshop on Advanced Computing and Analysis Techniques in Physics Research ACAT 2007”, Nationaal instituut voor subatomaire fysica, Amsterdam (Netherlands), 23 – 27 April 2007
 Attendance to the “School on Grid Computing”, Catania (Italy), 12 March – 12 April 2007
- 2006 Attendance to the “XCII Congresso Nazionale della Società Italiana di Fisica”, Torino (Italy), 18 – 23 September 2006
 Attendance to the “Cosmic Ray International Seminar CRIS 2006”, Catania (Italy), 29 May – 2 June 2006
- 2005 Attendance to the “XCI Congresso Nazionale della Società Italiana di Fisica”, Catania (Italy), 26 September – 1 October 2006

List of Publications - Referred Journals

- 2013
- M. De Domenico, M. Settimo, S. Riggi, E. Bertin, *Reinterpreting the development of extensive air showers initiated by nuclei and photons*, submitted to JCAP (2013), arXiv:1305.2331.
 - S. Riggi et al., *Muon tomography imaging algorithms for nuclear threat detection inside large volume containers with the Muon Portal detector*, Nucl. Instr. and Meth. A (2013), in press.
 - S. Riggi, S. Ingrassia, *Modeling high energy cosmic rays mass composition data via mixtures of multivariate skew-t distributions*, submitted to Astroparticle Physics (2013), arXiv:1301.1178.
 - P. Abreu et al., *Techniques for Measuring Aerosols using the Central Laser Facility at the Pierre Auger Observatory*, JINST, in press (2013).
 - P. Abreu et al., *Bounds on the density of sources of ultra-high energy cosmic rays from the Pierre Auger Observatory*, JCAP, in press (2013).
 - P. Abreu et al., *Ultra-High Energy Neutrinos at the Pierre Auger Observatory*, Advances in High Energy Physics 2013 (2013) 708680.
 - P. Abreu et al., *The Interpretation of the Depths of Shower Maximum of Extensive Air Showers Measured by the Pierre Auger Observatory*, JCAP 02 (2013) 026.
 - S. Riggi, A. Parra, G. Rodriguez, I. Valiño, R. Vázquez, E. Zas, *Identification of the primary mass of inclined cosmic ray showers from depth of maximum and number of muon parameters*, Nucl. Instr. Meth. A 707 (2013) 9, arXiv:1212.0218.

- 2012
- P. Abreu et al., *Constraints on the origin of cosmic rays above 10^{18} eV from large scale anisotropy searches in data of the Pierre Auger observatory*, ApJL 762 (2012) L13.
 - P. Abreu et al., *Results of a self-triggered prototype system at the Pierre Auger Observatory for radio-detection of air showers induced by cosmic rays*, JINST, in press (2012).
 - P. Abreu et al., *Large scale distribution of arrival directions of cosmic rays detected above 10^{18} eV at the Pierre Auger observatory*, Astrophysical Journal Supplement, in press (2012).
 - P. Abreu et al., *Ultra-High Energy Neutrinos at the Pierre Auger Observatory*, Advances in High Energy Physics, in press (2012).
 - P. Abreu et al., *A Search for Point Sources of EeV Neutrons*, ApJ, in press (2012).
 - P. Abreu et al., *Antennas for the Detection of Radio Emission Pulses from Cosmic-Ray induced Air Showers at the Pierre Auger Observatory*, JINST 7 (2012) P10011.
 - M. Settimo et al., *Measurement of the cosmic ray energy spectrum using hybrid events of the Pierre Auger Observatory*, Eur. Phys. J. Plus 127 (2012) 87.
 - P. Abreu et al., *The Rapid Atmospheric Monitoring System of the Pierre Auger Observatory*, JINST 7 (2012) P09001.
 - P. Abreu et al., *Measurement of the proton-air cross-section at $\sqrt{s} = 57$ TeV with the Pierre Auger Observatory*, Phys. Rev. Lett. 109 (2012) 062002.
 - P. Abreu et al., *Search for point-like sources of ultra-high energy neutrinos at the Pierre Auger Observatory and improved limit on the diffuse flux of tau neutrinos*, APJ-Letters 755 (2012) L4.
 - S. Aiola, P. La Rocca, F. Riggi, S. Riggi, *Detection of extensive cosmic air showers by small scintillation detectors with wavelength-shifting fibres*, Eur. J. Phys. 33 (2012) 1207.
 - S. Aiola, P. La Rocca, F. Riggi, S. Riggi, *Shielding effects of a building structure on the energy deposit of cosmic rays in a simple wavelength shifter-based scintillator*, Eur. J. Phys. 33 (2012) 539.
 - S. Riggi, A. Insolia, G. Medina-Tanco, E. Trovato, *Reconstruction of muon tracks in a buried plastic scintillator muon telescope (BATATA)*, Nucl. Instr. Meth. A688 (2012) 22.
 - P. Abreu et al., *Description of Atmospheric Conditions at the Pierre Auger Observatory using the Global Data Assimilation System (GDAS)*, Astroparticle Physics 35 (2012) 591-607.
 - P. Abreu et al., *Nature and origin of very high-energy cosmic rays*, Europhysics News, 43 (2012) 24.
 - P. Abreu et al., *A search for anisotropy in the arrival directions of ultra high energy cosmic rays recorded at the Pierre Auger Observatory*, JCAP 04 (2012) 040.
 - P. Abreu et al., *Search for signatures of magnetically-induced alignment in the arrival directions measured by the Pierre Auger Observatory*, Astroparticle Physics 35 (2012) 354-361.
- 2011
- P. Abreu et al., *Search for ultrahigh energy neutrinos in highly inclined events at the Pierre Auger Observatory*, Physical Review D 84 (2011) 122005.
 - P. Abreu et al., *The effect of the geomagnetic field on cosmic ray energy estimates and large scale anisotropy searches on data from the Pierre Auger Observatory*, JCAP 11 (2011) 022.
 - P. Abreu et al., *The Lateral Trigger Probability function for UHE Cosmic Rays Showers detected by the Pierre Auger Observatory*, Astroparticle Physics 35 (2011) 266.
 - P. Abreu et al., *Anisotropy and chemical composition of ultra-high energy cosmic rays using arrival directions measured by the Pierre Auger Observatory*, Journal of Cosmology and Astroparticle Physics JCAP06 (2011) 022.
 - S. Riggi, P. La Rocca, F. Riggi, *Introducing third year undergraduates to GEANT4 simulations of the light transport and collection in scintillation materials*, Eur. J. Phys. 32 (2011), 329.
 - P. Abreu et al., *The Pierre Auger Observatory scaler mode for the study of solar activity modulation of galactic cosmic rays*, JINST 6 (2011) P01003.
 - P. Abreu et al., *The exposure of the hybrid detector of the Pierre Auger Observatory*, Astroparticle Physics 34 (2011) 368.

- 2010
- P.Abreu et al., *Update on the correlation of the highest energy cosmic rays with nearby extragalactic matter*, *Astroparticle Physics* 34 (2010) 314.
 - S.Riggi, P.La Rocca, E. Leonora, D.Lo Presti, G.S.Pappalardo, F.Riggi, G.V.Russo, *Geant4 simulation of plastic scintillator strips with embedded optical fibers for a prototype of tomographic system*, *Nucl. Instr. Meth.* A624 (2010) 583.
 - J.Abraham et al., *The Fluorescence Detector of the Pierre Auger Observatory*, *Nucl. Instr. Meth.* A620 (2010) 227.
 - J.Abraham et al., *Measurement of the energy spectrum of cosmic rays above 10^{18} eV using the Pierre Auger Observatory*, *Phys. Lett. B* 685 (2010) 239.
 - J.Abraham et al., *Measurement of the Depth of Maximum of Extensive Air Showers above 10^{18} eV*, *Phys. Rev. Lett.* 104 (2010) 091101.
 - J.Abraham et al., *The Northern Site of the Pierre Auger Observatory*, *New Journal of Physics* 12 (2010) 035001.
 - J.Abraham et al., *A Study of the Effect of Molecular and Aerosol Conditions in the Atmosphere on Air Fluorescence Measurements at the Pierre Auger Observatory*, *Astroparticle Physics* 33 (2010) 108.
 - J.Abraham et al., *Trigger and Aperture of the surface detector array of the Pierre Auger Observatory*, *Nucl. Instr. Meth.* A613 (2010) 29.
- 2009
- J.Abraham et al., *Limit on the diffuse flux of ultrahigh energy tau neutrinos with the surface detector of the Pierre Auger Observatory*, *Phys. Rev. D* 79 (2009) 102001.
 - J.Abraham et al., *Atmospheric effects on extensive air showers observed with the surface detector of the Pierre Auger observatory*, *Astroparticle Physics* 32 (2009) 89.
 - J.Abraham et al., *Upper limit on the cosmic-ray photon fraction at EeV energies from the Pierre Auger Observatory*, *Astroparticle Physics* 31 (2009) 399.
- 2008
- J.Abraham et al., *Observation of the suppression of the flux of cosmic rays above $4 \cdot 10^{19}$ eV*, *Phys. Rev. Lett.* 101 (2008) 061101.
 - J.Abraham et al., *Upper Limit on the Diffuse Flux of Ultrahigh Energy Tau Neutrinos from the Pierre Auger Observatory*, *Phys. Rev. Lett.* 100 (2008) 211101.
 - J.Abraham et al., *Correlation of the highest-energy cosmic rays with the positions of nearby active galactic nuclei*, *Astroparticle Physics* 29 (2008) 188.
 - J.Abraham et al., *Upper limit on the cosmic-ray photon flux above 10^{19} eV using the surface detector of the Pierre Auger Observatory*, *Astroparticle Physics* 29 (2008) 243.
 - F.Blanco, P.La Rocca, F.Riggi and S.Riggi, *Timing the random and anomalous arrival of particles in a Geiger counter with GPS devices*, *Eur. J. Phys.* 29 (2008) 355.
- 2007
- J.Abraham et al., *Correlation of the highest energy cosmic rays with nearby extragalactic objects*, *Science* 318 (2007) 938.

List of Publications - Conference Proceedings

- 2013
- E. Sciacca et al., *VisIVO Workflow-Oriented Science Gateway for Astrophysical Visualization*, *Proceeding of Parallel, Distributed, and Network-Based Processing PDP 2013*, IEEE Computer Society, Conference Publishing Services (CPS) (2013).
 - P. Massimino et al., *Learning Astrophysics through Mobile Gaming*, *Proceeding of Astronomical Data Analysis Software and Systems XXII*, Astronomical Society of the Pacific (2013).
 - A. Costa et al., *VisIVO: A Web-Based, Workflow-Enabled Gateway for Astrophysical Visualization*, *Proceeding of Astronomical Data Analysis Software and Systems XXII*, Astronomical Society of the Pacific (2013).
- 2012
- S. Riggi for the Muon Portal Collaboration, *A large area cosmic ray detector for the inspection of hidden high-Z materials inside containers*, *Proceedings of the 23rd European Cosmic Rays Symposium (ECRS 2012)*, to appear in *Journal of Physics: Conference Series*.

- 2011
- P.Abreu et al., *The Pierre Auger Observatory V: Enhancements*, Proceedings of 32nd International Cosmic Ray Conference (ICRC 2011), arXiv:1107.4807v1.
 - P.Abreu et al., *The Pierre Auger Observatory IV: Operation and Monitoring*, Proceedings of 32nd International Cosmic Ray Conference (ICRC 2011), arXiv:1107.4806v1.
 - P.Abreu et al., *The Pierre Auger Observatory IV: Operation and Monitoring*
P.Abreu et al. The Pierre Auger Collaboration
Proceedings of 32nd International Cosmic Ray Conference (ICRC 2011), arXiv:1107.4806v1.
 - P.Abreu et al., *The Pierre Auger Observatory III: Other Astrophysical Observations*, Proceedings of 32nd International Cosmic Ray Conference (ICRC 2011), arXiv:1107.4805v1.
 - P.Abreu et al., *The Pierre Auger Observatory II: Studies of Cosmic Ray Composition and Hadronic Interaction models*, Proceedings of 32nd International Cosmic Ray Conference (ICRC 2011), arXiv:1107.4804v1.
 - P.Abreu et al., *The Pierre Auger Observatory I: The Cosmic Ray Energy Spectrum and Related Measurements*, Proceedings of 32nd International Cosmic Ray Conference (ICRC 2011), arXiv:1107.4809v1.
- 2010
- S.Riggi for the Pierre Auger Collaboration, *Mass composition results from the Pierre Auger Observatory*, Nucl. Phys. B (Proc. Suppl) 212-213 (2011) 252.
- 2009
- J.Abraham et al., *Operations of and Future Plans for the Pierre Auger Observatory*, Proceedings of 31st International Cosmic Ray Conference (ICRC 2009), arXiv:0906.2354.
 - J.Abraham et al., *Calibration and Monitoring of the Pierre Auger Observatory*, Proceedings of 31st International Cosmic Ray Conference (ICRC 2009), arXiv:0906.2358.
 - J.Abraham et al., *Studies of Cosmic Ray Composition and Air Shower Structure with the Pierre Auger Observatory*, Proceedings of 31st International Cosmic Ray Conference (ICRC 2009), arXiv:0906.2319.
 - J.Abraham et al., *Astrophysical Sources of Cosmic Rays and Related Measurements with the Pierre Auger Observatory*, Proceedings of 31st International Cosmic Ray Conference (ICRC 2009), arXiv:0906.2347.
 - J.Abraham et al., *The Cosmic Ray Energy Spectrum and Related Measurements with the Pierre Auger Observatory*, Proceedings of 31st International Cosmic Ray Conference (ICRC 2009), arXiv:0906.2189.
- 2007
- S.Riggi et al., *A neural network approach to high energy cosmic rays mass identification at the Pierre Auger Observatory*, Proceedings of Science PoS035 (Proceedings of XI International Workshop on Advanced Computing and Analysis Techniques in Physics Research - ACAT2007).
 - R.Knapik et al., *The Absolute, Relative and Multi-Wavelength Calibration of the Pierre Auger Observatory Fluorescence Detectors*, Proceedings of 30th International Cosmic Ray Conference (ICRC 2007).

List of Publications - Report and Internal Notes

- 2012
- S. Riggi, M. De Domenico, *Reinterpreting the development of extensive air showers initiated by UHE nuclei*, Auger Internal Note 2012-030 (2012).
- 2011
- S. Riggi, I. Valiño, R. Vázquez, E. Zas, *On the unfolding of the inclined energy spectrum*, Auger Internal Note 2011-140 (2011).
 - S. Riggi, D. Allard, M. Unger, *Combined spectrum- X_{max} fit with a likelihood approach*, Auger Internal Note 2011-101 (2011).
 - S. Riggi, G.A. Medina-Tanco, E. Trovato, *Reconstruction of muon tracks in the BATATA detector*, Auger Internal Note 2011-096 (2011).
- 2010
- M.DeDomenico, M.Scuderi, E.Trovato, R.Caruso, A.Insolia, S.Riggi, *Multiscale anisotropy approach to UHECR data*, Auger Internal Note 2010-005 (2010).

- 2009
- M.DeDomenico, M.Scuderi, E.Trovato, R.Caruso, A.Insolia, S.Riggi, *Filtering and Demodulating SD Events Rate from Temperature Trend*, Auger Internal Note 2009-125 (2009).
 - M.DeDomenico, M.Scuderi, E.Trovato, R.Caruso, A.Insolia, S.Riggi, *Deterministic cyclostationarity of the rate of UHECRs*, Auger Internal Note 2009-082 (2009).
 - M.DeDomenico, M.Scuderi, E.Trovato, R.Caruso, A.Insolia, S.Riggi, *Periodic Modulation on the SD Event Rate*, Auger Internal Note 2009-066 (2009).
 - M.Scuderi, R.Caruso, M.De Domenico, A.Insolia, S.Riggi, E.Trovato, *An algorithm to establish the arrival directions of CRs from extragalactic sources*, Auger Internal Note 2009-041 (2009).
 - E.Trovato, R.Caruso, M.De Domenico, A.Insolia, S.Riggi, M.Scuderi, *Analysis of Relative Calibration A data of Fluorescence Detector of Coihueco*, Auger Internal Note 2009-015 (2009).
 - M.De Domenico, R.Caruso, A.Insolia, S.Riggi, M.Scuderi, E.Trovato, *Search for Stochastic or Chaotic Behavior from Nonlinear Time Series Analysis of UHECR*, Auger Internal Note 2009-007 (2009).
 - S.Riggi, R.Caruso, M.De Domenico, A.Insolia, M.Scuderi, E.Trovato, *Mass composition analysis from likelihood fit to hybrid X_{max} data*, Auger Internal Note 2009-006 (2009).
- 2008
- M.De Domenico, R.Caruso, A.Insolia, S.Riggi, M.Scuderi, E.Trovato, *Nonlinearity and nonstationarity analysis of UHECR arrival times*, Auger Internal Note 2008-172 (2008).
 - M.De Domenico, R.Caruso, A.Insolia, S.Riggi, M.Scuderi, E.Trovato, *Development of a platform independent *x-like Virtual Machine for the P. Auger Data Analysis Software*, Auger Internal Note 2008-171 (2008).
 - M.De Domenico, R.Caruso, A.Insolia, S.Riggi, M.Scuderi, E.Trovato, *Development and Results from iPlot, a FD Calibration Data Analysis Tool*, Auger Internal Note 2008-138 (2008).
- 2007
- S.Riggi, R.Caruso, A.Insolia, M.Scuderi, *A neural network approach to event-by-event primary mass identification by means of FD observables*, Auger Internal Note 2007-054 (2007).
 - S.Riggi, R.Caruso, A.Insolia, M.Scuderi, *A Neural Network Approach to High Energy Cosmic Rays Mass Identification*, Report INFN AE_07/1 (2007).

Talks and Presentations - International Conferences

- 2012
- S.Riggi for the Muon Portal Collaboration, *A large area cosmic ray detector for the inspection of hidden high-Z materials inside containers*, 23rd European Cosmic Ray Symposium, Moscow (Russia), July 3 – 7, 2012.
 - S.Riggi, S.Petrera, D.Boncioli, A.Grillo, M.Unger, CRPropa team, *Astrophysical interpretation of spectrum and X_{max} data*, Auger Collaboration Meeting March 2012, Malargüe (Argentina), March 11 – 16, 2012.
 - S.Riggi for the Pierre Auger Collaboration, *Muon content and p-air cross section from Pierre Auger Observatory data*, XII Encontro Lisboa-Compostela, Santiago de Compostela (Spain), February 8 – 10, 2012.
- 2011
- S.Riggi, *Number of muons in inclined showers*, Auger Collaboration Meeting March 2011, Malargüe (Argentina), March 6 – 11, 2011.
 - S.Riggi, G.Rodriguez, R.Vazquez, *N19 reconstruction with inclined hybrids*, Auger Collaboration Meeting June 2011, Santiago de Compostela (Spain), June 20 – 24, 2011.
 - S.Riggi, D.Bocioli, S.Petrera, M.Unger, *Astrophysical interpretation of spectrum and X_{max} data*, Auger Collaboration Meeting November 2011, Malargüe (Argentina), November 13 – 18, 2011.
- 2010
- S.Riggi for the Pierre Auger Collaboration *Mass composition results from the Pierre Auger Observatory*, Cosmic Ray International Seminar (CRIS 2010), Catania (Italy), September 13 – 17, 2010.
 - S.Riggi, D.Allard, M.Unger, *Update on source composition fits*, Auger Collaboration Meeting November 2010, Malargüe (Argentina), November 13 – 19, 2010.
 - S.Riggi, *Mass composition studies with hybrids*, Seminar at the Universidad de Santiago de Compostela (Spain), December 17, 2010.

- 2009 ○ S.Riggi, *Update of the mass composition analysis with the likelihood method*, Seminar at the Forschungszentrum Karlsruhe (Germany), March 17, 2009.
- S.Riggi, M.Unger, *Update of the mass composition analysis with the likelihood method*, Auger Collaboration Meeting April 2009, Malargüe (Argentina), April 9 – 25, 2009.
- S.Riggi, D.Allard, M.Unger, *Source composition fits*, Auger Collaboration Meeting November 2009, Malargüe (Argentina), November 14 – 20, 2009.
- 2008 ○ S.Riggi, R.Caruso, A.Insolia, G.Medina Tanco, F.Sanchez, M.Scuderi, *Neural network for composition*, Auger Collaboration Meeting February 2008, Malargüe (Argentina), February 24–29, 2008.
- E.Trovato, R.Caruso, M.De Domenico, A.Insolia, S.Riggi, M.Scuderi, *Production of new calibration constants*, Auger Collaboration Meeting February 2008, Malargüe (Argentina), February 24–29, 2008.
- S.Riggi, M.Scuderi, *A brief report of Grid activities in Catania*, Auger Grid Meeting, Prague (Czech Rep.), April 15–18, 2008.
- S.Riggi, A.Insolia, M.Scuderi, *INFN and Auger in EELA-2 – NA3*, EELA-2 Kick-off Meeting 2007, Trujillo (Spain), April 20–23, 2008.
- S.Riggi, R.Caruso, M.De Domenico, A.Insolia, M.Scuderi, E.Trovato, *Mass composition analysis from likelihood fit to hybrid X_{max} data*, Auger Collaboration Meeting November 2008, Malargüe (Argentina), November 16–21, 2008.
- M.De Domenico, R.Caruso, A.Insolia, S.Riggi, M.Scuderi, E.Trovato, *Arrival time distribution of UHECRs with the use of nonlinear time series analysis*, Auger Collaboration Meeting November 2008, Malargüe (Argentina), November 16–21, 2008.
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