

# Rebeca Gonzalez Suarez

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## Current Position

Adjunct Research Associate at the University of Nebraska, Lincoln, US. Member of the CMS collaboration since 2006. Researcher stationed at CERN in Geneva (Switzerland) since 2008.

## Previous Positions

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|------|---|
| 2010 | <b>Post-doctoral fellow</b> ( <i>November - October 2012</i> ) at the Vrije Universiteit Brussel (VUB), Brussels (Belgium)                |
| 2006 | <b>PhD Student with an FPI grant</b> ( <i>September - October 2010</i> )<br>at Instituto de Fisica de Cantabria (IFCA), Santander (Spain) |

## Academic Degrees

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|------|---|
| 2010 | <b>Ph.D</b> at the Department of Modern Physics of the University of Cantabria, Santander (Spain)         |
| 2005 | <b>Degree in Fundamental Physics</b><br>at the Universidad de Oviedo, Facultad de Ciencias. Oviedo, Spain |

## Theses

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| 2010 | <b>Ph.D thesis</b> ( <i>9 Sep.</i> )<br>Title: ‘ <i>Search for a SM Higgs Boson in the LHC with the CMS experiment using the <math>H \rightarrow WW^* \rightarrow 2\mu 2\nu</math> decay channel</i> ’<br>Supervisors: J. Cuevas and T. Anoro. |
| 2007 | <b>Diploma de Estudios Avanzados</b> ( <i>21 Dec.</i> )<br>Title: ‘ <i>Search for a Higgs boson in CMS in the <math>H \rightarrow WW^* \rightarrow 2\mu 2\nu</math> decay channel</i> ’<br>Supervisors: J. Cuevas and T. Anoro.                |

## Positions of Responsibility

- ▷ **Higgs to WW convener:** [2015-2017] Coordinator of the Higgs to WW physics in the CMS experiment, covering all analyses studying the decay of the Higgs in two W bosons, independently of the production mode. Level 3 management within the CMS collaboration (Higgs group)
- ▷ **Single Top convener:** [2013-2014] Coordinator of single-top-quark related physics in the CMS experiment. Level 3 management within the CMS collaboration (Top group)
- **Editor** and contact of the publications arXiv:1411.3441 (PRD), and arXiv:1209.3489 (PRL); and of other public documents (TOP-11-022, HIG-14-012)
- **Contact person** for the simulation in the Higgs to WW subgroup [2014-2015]
- **Contact person** and developer of the local reconstruction of the Strip Tracker [2011-2012]
- **Contact person** for the High Level Trigger - Strip Tracker [2011-2012]
- **Run Field Manager:** (2015) coordinating during two weeks the operations of the CMS experiment, operating as the link between the shift crews and Run coordination

## Membership of Analysis Review Committees

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|------|--|
| 2015 | <ul style="list-style-type: none"> <li>– ‘Search for the associated production of a Higgs boson with a single top quark in proton-proton collisions at <math>\sqrt{s} = 8</math> TeV’ arXiv:1509.08159, Sub. to JHEP</li> <li>– <b>Chair</b> ‘Measurement of the top-quark mass from the b jet energy spectrum’ CMS-PAS-TOP-15-002</li> <li>– ‘Measurement of the charge asymmetry in top quark pair production in pp collisions at <math>\sqrt{s} = 8</math> TeV using a template method’ arXiv:1508.03862, Sub. to Phys. Rev. D</li> <li>– <b>Chair</b> ‘Measurement of the W boson helicity using <math>t\bar{t}</math> events in the dilepton final state at <math>\sqrt{s} = 8</math> TeV’ CMS-PAS-TOP-14-017</li> <li>– ‘Search for a standard model Higgs boson produced in association with a top-quark pair and decaying to bottom quarks using a matrix element method’ arXiv:1502.02485 Eur. Phys. J. C 75 (2015) 251</li> <li>– <b>Chair</b> ‘Search for monotop signatures in proton-proton collisions at <math>\sqrt{s} = 8</math> TeV’ arXiv:1410.1149 Phys. Rev. Lett. 114, 101801 (2015)</li> </ul> |
| 2014 | <ul style="list-style-type: none"> <li>– ‘Search for <math>t\bar{t}H</math> events in the <math>H \rightarrow b\bar{b}</math> final state using the Matrix Element Method’ (CMS-PAS-HIG-14-010)</li> <li>– ‘Searches for electroweak production of charginos, neutralinos, and sleptons decaying to leptons and W, Z, and Higgs bosons in pp collisions at 8 TeV’ arXiv:1405.7570, EPJC 74 (2014) 3036</li> <li>– <b>Chair</b> ‘Search for new physics with monotop final states in pp collisions at <math>\sqrt{s} = 8</math> TeV’ (CMS-PAS- B2G-12-022)</li> <li>– ‘Search for associated production of a single top quark and a Higgs boson in events where the Higgs boson decays to two photons at <math>\sqrt{s} = 8</math> TeV’ (CMS-PAS-HIG-14-001)</li> </ul>   |
| 2013 | <ul style="list-style-type: none"> <li>– ‘Projections for Top FCNC Searches in <math>3000fb^{-1}</math> at the LHC’ (CMS-PAS-FTR-13-016)</li> <li>– ‘Sensitivity study of the prospects for searching for heavy vector-like charge 2/3 quarks at <math>\sqrt{s} = 14</math> TeV with the upgraded CMS detector’ (CMS-PAS-FTR-13-026)</li> <li>– ‘Projected improvement of the accuracy of top-quark mass measurements at the upgraded LHC’ (CMS-PAS-FTR-13-017)</li> <li>– ‘CMS reach in <math>B_s^0 \rightarrow \mu^+\mu^-</math> and <math>B^0 \rightarrow \mu^+\mu^-</math> branching fractions for the new LHC runs’ (CMS-PAS-FTR-13-022)</li> <li>– ‘Search for electroweak production of charginos and neutralinos using leptonic final states’ (CMS-PAS-SUS-13-006)</li> <li>– ‘Search for electroweak production of charginos, neutralinos and sleptons using leptonic final states in pp collisions at <math>\sqrt{s} = 8</math> TeV’ (CMS-PAS-SUS-12-022)</li> </ul>   |
| 2012 | <ul style="list-style-type: none"> <li>– ‘Search for electroweak production of charginos and neutralinos using leptonic final states in pp collisions at <math>\sqrt{s} = 7</math> TeV’ arXiv:1209.6620, JHEP 1211 (2012) 147</li> <li>– ‘Search for physics beyond the standard model in events with a Z boson, jets, and missing transverse energy in pp collisions at <math>\sqrt{s} = 7</math> TeV’ arXiv:1204.3774, Physics Letters B 716 (2012) 260-284</li> </ul>   |
| 2011 | <ul style="list-style-type: none"> <li>– ‘Search for Physics Beyond the Standard Model in Z+MET+Jets events at the LHC’ (CMS-PAS-SUS-11-019)</li> </ul>  |

## Participation in Thesis Boards

- 2015 | **PhD thesis committee**  
(20th March) at Uppsala University (Sweden)  
Thesis Title: '*Search for a Charged Higgs Boson in ATLAS and Development of Novel Technology for Future Particle Detector Systems*'  
by **Daniel Pelikan**
- 2013 | **Master thesis promotor**  
(24 June) at the Vrije Universiteit Brussel (Belgium)  
Thesis Title: '*Measurement of the single top  $tW$  associated production in the dilepton decay channel in proton proton collisions at a center of mass energy of 8 TeV*'  
by **Isis Marina Van Parijs**

## Participation in Conferences and Seminars

- 2015 | **▷ LPC Physics Forum**  
Title: ' *$H \rightarrow WW$  at CMS*'  
13 August, Fermilab, Batavia IL (United States)
- ▷ Seminar at the University of Nebraska, Lincoln**  
Title: '*Higgs boson decays to  $WW$  at CMS*'  
10 August, University of Nebraska, Lincoln NE (United States)
- ▷ DPF2015: 2015 Meeting of the Division of Particles and Fields of the American Physical Society**  
Contribution: Parallel Talk  
Title: '*Run-1 Single-top measurements at CMS*'  
4-8 Aug, University of Michigan, Ann Arbor, MI (United States)
- ▷ Seminar at University of Goettingen, II. Physikalisches Institut**  
Title: '*Overview of single top physics in CMS with Run-1 data*'  
19th June, Goettingen (Germany)
- ▷ SM@LHC: Standard Model at LHC**  
Contribution: **Plenary Talk**  
Title: '*LHC results on Spin, Anomalous Couplings, and CP structure*'  
21-24 April, Galileo Galilei Institute, Florence (Italy)
- ▷ Seminar at the Universite Catholique de Louvain**  
Title: '*Is it the Higgs? Characterization of the  $H(125)$  resonance (spin, parity, tensor structure) with leptonic  $WW$  decays*'  
18th March, Louvain la Neuve (Belgium)
- ▷ Seminar at the EPFL Lausanne**  
Title: '*Overview of single top physics in CMS with Run-1 data*'  
2d of March, Lausanne (Switzerland)
- 2014 | **▷ Second CMS Single Top Workshop**  
Contribution: **Scientific Program and Talk**  
Title: '*Lessons learned from Run1 and future prospects*'  
4-5 December, Palazzo Alabardieri, Naples (Italy)
- ▷ Collider Cross Talk**  
Title: ' *$H \rightarrow WW$  from ATLAS and CMS*'  
27 November, CERN (Switzerland)

- 2014 ▷ **LHCP 2014 - The Second Large Hadron Collider Physics conference**  
 Contribution: **Chair of the TOP Parallel sessions**  
 2-7 June, New York City (United States)
- ▷ **LHC seminar**  
 Title: *‘Recent top physics results from CMS’*  
 25 February, CERN (Switzerland)
- 2013 ▷ **CMS Single Top Workshop**  
 Contribution: **Scientific Program and Closing Talk**  
 Title: *‘Next steps and summary’*  
 19-20 December, Palazzo Alabardieri, Naples (Italy)
- ▷ **Seminar at Uppsala University**  
 Title: *‘Overview of single top results at the LHC’*  
 10 October, Uppsala (Sweden)
- ▷ **TOP2013 - 6th International Workshop on Top Quark Physics**  
 Contribution: **Plenary Talk**  
 Title: *‘Inclusive single top cross section at the LHC’*  
 4-19 September, Durbach (Germany)
- 2012 ▷ **4th generation and single-top: Workshop on fourth fermion generation and on single-top production**  
 Contribution: **Invited Talk**  
 Title: *‘ $tW$  production at CMS’*  
 26-28 March, Leinsweiler (Germany)
- ▷ **Rencontres de Moriond, QCD and High Energy Interactions**  
 Contribution: **Plenary Talk**  
 Title: *‘Single Top Production at  $\sqrt{s} = 7\text{TeV}$ ’*  
 10-17 March, La Thuile (Italy)
- 2010 ▷ **II CPAN days**, Segundas Jornadas del CPAN  
 Contribution: **Invited Plenary Talk**  
 Title: *‘Higgs and SUSY searches in CMS’*  
 29-30 November, Valencia (Spain)
- ▷ **BEACH 2010 IX International Conference on Hyperons, Charm and Beauty Hadrons**  
 Contribution: **Plenary Talk**  
 Title: *‘Higgs Search Prospects at the LHC’*  
**Chair of the session ‘Heavy Flavor Decays and Properties - I’**  
 21-26 June, Perugia (Italy)
- 2009 ▷ **PASCOS 2009** 15th International Symposium on Particles Strings and Cosmology  
 Contribution: **Parallel Talk**  
 Title: *‘EW symmetry breaking at the LHC’*  
 6-10 July, Hamburg (Germany)
- 2008 ▷ **ICHEP08** 34th International Conference on High Energy Physics  
 Contribution: **Poster**  
 Title: *‘Discovery Potential for the SM Higgs Boson in the  $H \rightarrow WW^* \rightarrow 2l2\nu$  channel at LHC’*  
 July 29 - August 5, Philadelphia, Pennsylvania (United States)
- 2007 ▷ **CHEP’07** International Conference on Computing in High Energy and Nuclear Physics  
 Contribution: **Poster** (co-autor)  
 Title: *‘A software and computing prototype for CMS Muon system alignment’*  
 2-7 September, Victoria BC (Canada)

## Other Conferences/Workshop/Schools

- 2011
  - ▷ **TOP2011, 4th International Workshop on Top Quark Physics**  
25 - 30 September, Sant Feliu de Guixols (Spain)
  - ▷ **CMS Physics Week**  
11-15 September, Brussels (Belgium)  
**Co-chair of the poster session**
  - ▷ **Rencontres de Moriond, QCD and High Energy Interactions**  
20-27 March, La Thuile (Italy)
- 2009
  - ▷ **Frontier Physics at the LHC - CMS Physics Week**  
7-11 September, Bologna, (Italy)
  - ▷ **Fourth joint CERN-Fermilab Hadron Collider Physics Summer School**  
June 8-17 2009, at CERN, Geneva (Switzerland)
  - ▷ **XXXVII International Meeting on Fundamental Physics**  
8-13 February, Centro de Ciencias Pedro Pascual, Benasque (Spain)
- 2007
  - ▷ **Grupos de Trabajo de las Jornadas Tecnicas RedIRIS 2007**  
19 and 20 November, Universidad de Oviedo, Campus de Mieres (Spain)
- 2006
  - ▷ **TAE 2006 V Taller de Altas Energias**  
3-14 July, (IFCA), Santander (Spain)
  - ▷ **Meeting of the Interactive European Grid Project**  
*int.eu.grid Kick-off Meeting*, 19-23 de June, Santander (Spain)

## Outreach Activities

- **Official CERN guide** since 2011, and **Official CMS guide** with more than 100 visits underground, including virtual visits to international audiences
- **CERN contact** of the Expanding your horizons (EYH) conference in Geneva, 14th November 2015, and 16th November 2013. Organizer of the 4 CERN workshops. **Workshop leader** of the ‘Questions without answers at the LHC’ session in the EYH event in 2011
- **Moderator** of the International Masterclasses by the International Particle Physics Outreach Group (IPPOG) (2015)
- ‘Ask a scientist’ activity in the night of the Researchers (FNAC Rive Geneva 2014, FNAC Balaxert Geneva 2015)
- Role in the official CERN LHC Season 2 videos [link] (2015), Speaking role in the videos advertising the US contribution to the CMS Experiment [link] (2014)
- Contributions to the CMS blog ‘the Cylindrical Onion’ and to the IPPOG website
- Personal blog with CERN pictures, ‘lonelychairsatcern.tumblr.com’ (20K followers)
- ‘Particle Fever’ movie meet and greet in the University of Columbia (NY) (2014)
- Guest speaker at ENP Ferney for gender awareness training (2012)

## Other Activities

- Experienced shifter: Offline Drift Tube muon chambers (DT) (2008), DT online (2009), DT on-call (2010), Detector Control Safety (DCS) (2010-2011), **Shift Leader** (2012-today), and **Run Field Manager** (2015)

## Publications

(PA = Primary Author; ED = Editor; C = Contributor; R = Review; P = Proceedings)

**Search for the associated production of a Higgs boson with a single top quark in proton-proton collisions at  $\sqrt{s} = 8$  TeV**, *CMS Collaboration (Serguei Chatrchyan et al.)*, arXiv:1509.08159, Sub. to JHEP [C,R]

**Precise determination of the mass of the Higgs boson and tests of compatibility of its couplings with the standard model predictions using proton collisions at 7 and 8 TeV**, *CMS Collaboration (Serguei Chatrchyan et al.)*, arXiv:1412.8662, Eur. Phys. J. C 75 (2015) 212 [C]

**Constraints on the spin-parity and anomalous HVV couplings of the Higgs boson in proton collisions at 7 and 8 TeV**, *CMS Collaboration (Serguei Chatrchyan et al.)*, arXiv:1411.3441, Phys. Rev. D 92, 012004 [PA, ED]

**Measurement of the W boson helicity in events with a single reconstructed top quark in pp collisions at  $\sqrt{s} = 8$  TeV**, *CMS Collaboration (Serguei Chatrchyan et al.)*, arXiv:1410.1154, JHEP01(2015)053 [R - Single Top]

**Observation of the associated production of a single top quark and a W boson in pp collisions at  $\sqrt{s} = 8$  TeV**, *CMS Collaboration (Serguei Chatrchyan et al.)*, arXiv:1401.2942, Phys. Rev. Lett. 112, 231802. [PA]

**Measurement of the t-channel single-top-quark production cross section and of the  $|V_{tb}|$  CKM matrix element in pp collisions at  $\sqrt{s} = 8$  TeV**, *CMS Collaboration (Serguei Chatrchyan et al.)*, arXiv:1403.7366, JHEP 06 (2014) 090 [R - Single top]

**Measurement of Higgs boson production and properties in the WW decay channel with leptonic final states**, *CMS Collaboration (Serguei Chatrchyan et al.)*, arXiv:1312.1129, JHEP 01(2014)096 [PA]

**Inclusive single top cross section at the LHC**, *Rebeca Gonzalez Suarez on behalf of the CMS and ATLAS collaborations*, proceedings TOP2013, DOI:10.3204/DESY-PROC-2014-02/16 [P]

**Snowmass 2013 Top quark working group report**, *Top Quark Working Group Collaboration (K. Agashe et al.)*, arXiv:1311.2028 [C]

**Evidence for associated production of a single top quark and W boson in pp collisions at 7 TeV**, *CMS Collaboration (Serguei Chatrchyan et al.)*, arXiv:1209.3489, Phys. Rev. Lett. 110, 022003 (2013) [PA, ED]

**Single top Production at  $\sqrt{s} = 7$  TeV**, *Rebeca Gonzalez Suarez on behalf of the CMS, ATLAS collaborations*, proceedings Moriond 2012, arXiv:1205.2786 [P]

**Search for the standard model Higgs boson decaying to a W pair in the fully leptonic final state in pp collisions at  $\sqrt{s} = 7$  TeV**, *CMS Collaboration (Serguei Chatrchyan et al.)*, Phys.Lett. B 710 (2012) 91-113, arXiv:1202.1489 [C]

**Measurement of the  $t\bar{t}$  Production Cross Section in pp Collisions at 7 TeV in Lepton + Jets Events Using b-quark Jet Identification**, *CMS Collaboration (Serguei Chatrchyan et al.)*, Phys.Rev. D84 (2011) 092004, arXiv:1108.3773 [C]

**Higgs search prospects at the LHC**, *Rebeca Gonzalez Suarez*, Nucl.Phys.Proc.Suppl. 210-211 (2011) 283-288 [P]

**Measurement of  $W^+W^-$  Production and Search for the Higgs Boson in pp Collisions at  $\sqrt{s} = 7$  TeV**, *CMS Collaboration (Serguei Chatrchyan et al.)*, Phys.Lett. B 699 (2011) 25-47, arXiv:1102.5429 [C]

**Discovery Potential for the SM Higgs Boson in the  $H \rightarrow WW^* \rightarrow 2l2\nu$  channel at LHC**, *Rebeca Gonzalez Suarez*, arXiv:0810.1468 [P]

**A Software and Computing prototype for CMS Muon System alignment**, (*Iban Cabrillo, Isidro Gonzalez Caballero, Rebeca Gonzalez Suarez...*), Journal of Physics: Conference Series 119 (2008) 072008 [P]

## Public Results

(PA = Primary Author; ED = Editor; C = Contributor; R = Review)

- ‘Measurements of the Higgs boson production and decay rates and constraints on its couplings from a combined ATLAS and CMS analysis of the LHC pp collision data at  $\sqrt{s}=7$  and 8 TeV’ (CMS-PAS-HIG-15-002) [C]
- ‘Measurements of the differential cross section of single top-quark production in the t channel in proton-proton collisions at  $\sqrt{s} = 8\text{TeV}$ ’ (CMS-PAS-TOP-14-004) [R - Single top]
- ‘Search for  $H \rightarrow b\bar{b}$  in association with single top quarks as a test of Higgs boson couplings’ (CMS-PAS-HIG-14-015) [C]
- ‘Combination of cross-section measurements of associated production of a single top-quark and a W boson at  $\sqrt{s} = 8$  TeV with the ATLAS and CMS experiments’ (CMS-PAS-TOP-14-009) [C, R - Single top]
- ‘Constraints on Anomalous HWW Interactions using Higgs boson decays to  $W+W^-$  in the fully leptonic final state’ (CMS-PAS-HIG-14-012) [PA, ED]
- ‘Constraints on anomalous HVV interactions using H to  $4l$  decays’ (CMS-PAS-HIG-14-014) [C]
- ‘Search for anomalous  $Wtb$  couplings and top FCNC in t-channel single-top-quark events’ (CMS-PAS-TOP-14-007) [R - Single top]
- ‘Search for anomalous single top quark production in association with a photon’ (CMS-PAS-TOP-14-003) [R - Single top]
- ‘Search for s-channel single top-quark production in pp collisions at  $\sqrt{s} = 8\text{TeV}$ ’ (CMS-PAS-TOP-13-009) [R - Single top]

- ‘Measurement of top quark polarization in t-channel single-top production’ (CMS-PAS-TOP-13-001) [R - Single top]
- ‘Combination of single top-quark cross-sections measurements in the t-channel at  $\sqrt{s} = 8\text{TeV}$  with the ATLAS and CMS experiments’ (CMS-PAS-TOP-12-002) [R - Single top]
- ‘Observation of Associated Production of a Single Top Quark and W Boson in pp Collisions at  $\sqrt{s} = 8\text{TeV}$ ’ (CMS-PAS-TOP-12-040) [PA]
- ‘Search for Flavor-Changing Neutral Currents in tZ events in proton-proton collisions at  $\sqrt{s} = 7\text{TeV}$ ’ (CMS-PAS-TOP-12-021) [R - Single top]
- ‘Measurement of the single-top t-channel charge ratio at 8 TeV’ (CMS-PAS-TOP-12-038) [R - Single top]
- ‘Measurement of W-helicity fractions in single top events topology’ (CMS-PAS-TOP-12-020) [R - Single top]
- ‘Search for single top tW associated production in the dilepton decay channel in pp collisions at  $\sqrt{s} = 7\text{ TeV}$ ’ (CMS-PAS-TOP-11-022) [PA, ED]
- ‘Measurement of the top-quark pair-production cross section in the lepton+jets channel with the use of b-tagging’ (CMS-PAS-TOP-10-003) [C]
- ‘Measurement of the top-quark pair-production cross section in the di-lepton channel at 7 TeV’ (CMS-PAS-TOP-10-005) [C]
- ‘Search for  $H \rightarrow WW \rightarrow 2l\ 2\nu$ ’ (CMS-PAS-HIG-10-003) [C]
- ‘Observation of WW final state’ (CMS-PAS-EWK-009) [C]
- ‘Performance of muon identification in pp collisions at  $\sqrt{s} = 7\text{ TeV}$ ’ (CMS-PAS-MUO-10-002) [PA]
- ‘Search Strategy for a Standard Model Higgs Boson Decaying to Two W Bosons in the Fully Leptonic Final State’ (CMS-PAS-HIG-08-006) [PA]
- ‘Search for the Higgs boson in the WW decay channel with the CMS experiment’ (CMS-PAS-HIG-07-001) [PA]

Rebeca Gonzalez Suarez, October 7, 2015