

# Rebeca Gonzalez Suarez

Member of the CMS collaboration since 2006.

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## Current position

*Adjunct Research Associate* at the University of Nebraska, Lincoln, US (Nov. 1st 2012)

## Previous positions

2010-2012 Post-doctoral fellow at the Vrije Universiteit Brussel (VUB), Brussels (Belgium)  
2006-2010 PhD Student with an FPI grant at Instituto de Fisica de Cantabria (IFCA), Santander (Spain)

## Education

2010 Ph.D at the University of Cantabria, Santander (Spain)  
2007 D.E.A, Diploma de Estudios Avanzados at the University of Cantabria, Santander (Spain)  
2005 Degree in Fundamental Physics at the Universidad de Oviedo, Oviedo (Spain)

## Theses

2010 PH.D THESIS (9 Sep.)  
*Search for a SM Higgs Boson in the LHC with the CMS experiment using the  $H \rightarrow WW^* \rightarrow 2\mu 2\nu$  decay channel*  
Supervisors: J. Cuevas and T. Anoro.  
2007 Diploma de Estudios Avanzados (21 Dec.)  
*Search for a Higgs boson in CMS in the  $H \rightarrow WW^* \rightarrow 2\mu 2\nu$  decay channel*  
Supervisors: J. Cuevas and T. Anoro.

## Positions of Responsibility

2015-2017 **Higgs to WW convener:** 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)  
2013-2014 **Single Top convener:** 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)  
2014-2015 **Contact person** for the simulation in the Higgs to WW subgroup  
2011-2012 **Contact person** and developer of the local reconstruction of the Strip Tracker  
2011-2012 **Contact person** for the High Level Trigger - Strip Tracker  
2015 **Run Field Manager** coordinating during two weeks the operations of the CMS experiment, operating as the link between the shift crews and Run coordination

## 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

## Seminars

- 2015 **Seminar at Stony Brook University** 17 December, Stony Brook, NY (United States)  
*Top quark and Higgs boson physics at the LHC*  
**Wine & Cheese: Fermilab Joint Experimental - Theoretical Physics Seminar** 20 November, Batavia, IL (United States)  
*Recent Results from CMS on Top and Higgs*  
**LPC Physics Forum** 13 August, Fermilab, Batavia IL (United States)  
 *$H \rightarrow WW$  at CMS*  
**Seminar at the University of Nebraska, Lincoln** 10 August, University of Nebraska, Lincoln NE (United States)  
*Higgs boson decays to WW at CMS*  
**Seminar at University of Goettingen, II. Physikalisches Institut** 19th June, Goettingen (Germany)  
*Overview of single top physics in CMS with Run-1 data*  
**Seminar at the Universite Catholique de Louvain** 18th March, Louvain la Neuve (Belgium)  
*Is it the Higgs? Characterization of the  $H(125)$  resonance (spin, parity, tensor structure) with leptonic WW decays*  
**Seminar at the EPFL Lausanne** 2d of March, Lausanne (Switzerland)  
*Overview of single top physics in CMS with Run-1 data*
- 2014 **CERN Collider Cross Talk** 27 November, CERN (Switzerland)  
 *$H \rightarrow WW$  from ATLAS and CMS*  
**LHC seminar** 25 February, CERN (Switzerland)  
*Recent top physics results from CMS*
- 2013 **Seminar at Uppsala University** 10 October, Uppsala (Sweden)  
*Overview of single top results at the LHC*

## Conferences

- 2015 **DPF2015:** 2015 Meeting of the Division of Particles and Fields of the American Physical Society  
Parallel Talk *Run-1 Single-top measurements at CMS*  
4-8 Aug, University of Michigan, Ann Arbor, MI (United States)  
**SM@LHC:** Standard Model at LHC  
Plenary Talk *LHC results on Spin, Anomalous Couplings, and CP structure*  
21-24 April, Galileo Galilei Institute, Florence (Italy)
- 2014 **Second CMS Single Top Workshop**  
Scientific Program and Talk *Lessons learned from Run1 and future prospects*  
4-5 December, Palazzo Alabardieri, Naples (Italy)  
**LHCP 2014:** The Second Large Hadron Collider Physics conference  
Chair of the TOP Parallel sessions  
2-7 June, New York City (United States)
- 2013 **CMS Single Top Workshop**  
Scientific Program and Closing Talk *Next steps and summary*  
19-20 December, Palazzo Alabardieri, Naples (Italy)  
**TOP2013:** 6th International Workshop on Top Quark Physics  
Plenary Talk *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  
Invited Talk *tW production at CMS*  
26-28 March, Leinsweiler (Germany)  
**Rencontres de Moriond** QCD and High Energy Interactions  
Plenary Talk *Single Top Production at  $\sqrt{s} = 7\text{TeV}$*   
10-17 March, La Thuile (Italy)
- 2010 **II CPAN days:** Segundas Jornadas del CPAN  
Invited Plenary Talk *Higgs and SUSY searches in CMS*  
29-30 November, Valencia (Spain)  
**BEACH 2010** IX International Conference on Hyperons, Charm and Beauty Hadrons  
Plenary Talk *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  
Parallel Talk *EW symmetry breaking at the LHC*  
6-10 July, Hamburg (Germany)
- 2008 **ICHEP08:** 34th International Conference on High Energy Physics  
Poster *Discovery Potential for the SM Higgs Boson in the  $H \rightarrow WW^* \rightarrow 2l2\nu$  channel at the LHC*  
July 29 - August 5, Philadelphia, Pennsylvania (United States)
- 2007 **CHEP07:** International Conference on Computing in High Energy and Nuclear Physics  
Poster (co-autor) *A software and computing prototype for CMS Muon system alignment*  
2-7 September, Victoria BC (Canada)

## Membership of Analysis Review Committees

- 2015  $\diamond$  *Search for the associated production of a Higgs boson with a single top quark in proton-proton collisions at  $\sqrt{s} = 8\text{ TeV}$*  arXiv:1509.08159, Sub. to JHEP  
 $\diamond$  *Measurement of the top-quark mass from the b jet energy spectrum* TOP-15-002 **Chair**  
 $\diamond$  *Measurement of the charge asymmetry in top quark pair production in pp collisions at  $\sqrt{s} = 8\text{ TeV}$  using a template method* arXiv:1508.03862, Accepted Phys. Rev. D  
 $\diamond$  *Measurement of the W boson helicity using  $t\bar{t}$  events in the dilepton final state at  $\sqrt{s} = 8\text{ TeV}$*  TOP-14-017 **Chair**  
 $\diamond$  *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  
 $\diamond$  *Search for monotop signatures in proton-proton collisions at  $\sqrt{s} = 8\text{ TeV}$*  arXiv:1410.1149 Phys. Rev. Lett. 114, 101801 (2015) **Chair**
- 2014  $\diamond$  *Search for  $t\bar{t}H$  events in the  $H \rightarrow b\bar{b}$  final state using the Matrix Element Method* HIG-14-010  
 $\diamond$  *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  
 $\diamond$  *Search for new physics with monotop final states in pp collisions at  $\sqrt{s} = 8\text{ TeV}$*  B2G-12-022 **Chair**  
 $\diamond$  *Search for associated production of a single top quark and a Higgs boson in events where*

*the Higgs boson decays to two photons at  $\sqrt{s} = 8$  TeV* HIG-14-001

- 2013
- ◇ *Projections for Top FCNC Searches in  $3000\text{fb}^{-1}$  at the LHC* FTR-13-016
  - ◇ *Sensitivity study of the prospects for searching for heavy vector-like charge 2/3 quarks at  $\sqrt{s} = 14$  TeV with the upgraded CMS detector* FTR-13-026
  - ◇ *Projected improvement of the accuracy of top-quark mass measurements at the upgraded LHC* FTR-13-017
  - ◇ *CMS reach in  $B_s^0 \rightarrow \mu^+ \mu^-$  and  $B^0 \rightarrow \mu^+ \mu^-$  branching fractions for the new LHC runs* FTR-13-022
  - ◇ *Search for electroweak production of charginos and neutralinos using leptonic final states* SUS-13-006
  - ◇ *Search for electroweak production of charginos, neutralinos and sleptons using leptonic final states in pp collisions at  $\sqrt{s} = 8$  TeV* SUS-12-022
- 2012
- ◇ *Search for electroweak production of charginos and neutralinos using leptonic final states in pp collisions at  $\sqrt{s} = 7$  TeV* arXiv:1209.6620, JHEP 1211 (2012) 147
  - ◇ *Search for physics beyond the standard model in events with a Z boson, jets, and missing transverse energy in pp collisions at  $\sqrt{s} = 7$  TeV* arXiv:1204.3774, Physics Letters B 716 (2012) 260-284
- 2011
- ◇ *Search for Physics Beyond the Standard Model in Z+MET+Jets events at the LHC* SUS-11-019

## Selected Journal articles

Ordered by PA = Primary Author; ED = Editor; C = Contributor; R = Review; P = Proceedings

- 2015
- ◇ CMS Collab. *Constraints on the spin-parity and anomalous HVV couplings of the Higgs boson in proton collisions at 7 and 8 TeV* arXiv:1411.3441, Phys. Rev. D 92, 012004 [PA-ED]
- 2014
- ◇ CMS Collab. *Observation of the associated production of a single top quark and a W boson in pp collisions at  $\sqrt{s} = 8$  TeV*, arXiv:1401.2942, Phys. Rev. Lett. 112, 231802. [PA]
  - ◇ CMS Collab. *Measurement of Higgs boson production and properties in the WW decay channel with leptonic final states*, arXiv:1312.1129, JHEP 01(2014)096 [PA]
- 2013
- ◇ CMS Collab. *Evidence for associated production of a single top quark and W boson in pp collisions at 7 TeV*, arXiv:1209.3489, Phys. Rev. Lett. 110, 022003 (2013) [PA-ED]
- 2015
- ◇ CMS Collab. *Search for the associated production of a Higgs boson with a single top quark in proton-proton collisions at  $\sqrt{s} = 8$  TeV*, arXiv:1509.08159, Sub. to JHEP [C-R]
  - ◇ CMS Collab. *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*, arXiv:1412.8662, Eur. Phys. J. C 75 (2015) 212 [C]
- 2013
- ◇ *Snowmass 2013 Top quark working group report*, arXiv:1311.2028 [C]
- 2012
- ◇ CMS Collab. *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*, arXiv:1202.1489, Phys.Lett. B 710 (2012) 91-113 [C]
- 2011
- ◇ CMS Collab. *Measurement of the  $t\bar{t}$  Production Cross Section in pp Collisions at 7 TeV in Lepton + Jets Events Using b-quark Jet Identification*, arXiv:1108.3773, Phys.Rev. D84 (2011) 092004 [C]
  - ◇ CMS Collab. *Measurement of  $W^+W^-$  Production and Search for the Higgs Boson in pp Collisions at  $\sqrt{s} = 7$  TeV*, arXiv:1102.5429, Phys.Lett. B 699 (2011) 25-47 [C]
- 2015
- ◇ CMS Collab. *Search for anomalous single top quark production in association with a photon in pp collisions at  $\sqrt{s} = 8$  TeV*, arXiv:1511.03951, Submitted to J. High Energy Phys [R - Single Top]

- 2014 ◇ CMS Collab. *Measurement of top quark polarisation in t-channel single top quark production*, arXiv:1511.02138, Submitted to J. High Energy Phys [R - Single Top]
- 2014 ◇ CMS Collab. *Measurement of the W boson helicity in events with a single reconstructed top quark in pp collisions at  $\sqrt{s} = 8$  TeV*, arXiv:1410.1154, JHEP01(2015)053 [R - Single Top]
- 2014 ◇ CMS Collab. *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*, arXiv:1403.7366, JHEP 06 (2014) 090 [R - Single top]
- 2015 ◇ *Run-1 Single-top measurements at CMS*, Proceedings DPF 2015, arXiv:1510.05235 [P]
- 2014 ◇ *Inclusive single top cross section at the LHC*, Proceedings TOP 2013, DOI:10.3204/DESY-PROC-2014-02/16 [P]
- 2012 ◇ *Single top Production at  $\sqrt{s} = 7$  TeV*, Proceedings Moriond 2012, arXiv:1205.2786 [P]
- 2010 ◇ *Higgs search prospects at the LHC*, Proceedings BEACH 2010, Nucl.Phys.Proc.Suppl. 210-211 (2011) 283-288 [P]
- 2008 ◇ *Discovery Potential for the SM Higgs Boson in the  $H \rightarrow WW^* \rightarrow 2l2\nu$  channel at LHC*, Proceedings ICHEP 2008, arXiv:0810.1468 [P]
- 2007 ◇ *A Software and Computing prototype for CMS Muon System alignment*, Proceedings CHEP 2007, Journal of Physics: Conference Series 119 (2008) 072008 [P]

## Selected Public Results

Ordered by: PA = Primary Author; ED = Editor; C = Contributor; R = Review

- 2014 ◇ *Constraints on Anomalous HWW Interactions using Higgs boson decays to  $W+W^-$  in the fully leptonic final state* HIG-14-012 [PA- ED]
- 2012 ◇ *Observation of Associated Production of a Single Top Quark and W Boson in pp Collisions at  $\sqrt{s} = 8$  TeV* TOP-12-040 [PA]
- 2011 ◇ *Search for single top tW associated production in the dilepton decay channel in pp collisions at  $\sqrt{s} = 7$  TeV* TOP-11-022 [PA- ED]
- 2010 ◇ *Performance of muon identification in pp collisions at  $\sqrt{s} = 7$  TeV* MUO-10-002 [PA]
- 2008 ◇ *Search Strategy for a Standard Model Higgs Boson Decaying to Two W Bosons in the Fully Leptonic Final State* HIG-08-006 [PA]
- 2007 ◇ *Search for the Higgs boson in the  $WW$  decay channel with the CMS experiment* HIG-07-001 [PA]
- 2015 ◇ *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* HIG-15-002 [C]
- 2014 ◇ *Search for  $H \rightarrow b\bar{b}$  in association with single top quarks as a test of Higgs boson couplings* HIG-14-015 [C]
- 2014 ◇ *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* TOP-14-009 [C-R Single top]
- 2011 ◇ *Constraints on anomalous HVV interactions using H to  $4l$  decays* HIG-14-014 [C]
- 2011 ◇ *Measurement of the top-quark pair-production cross section in the lepton+jets channel with the use of b-tagging* TOP-10-003 [C]
- 2010 ◇ *Search for  $H \rightarrow WW \rightarrow 2l 2\nu$*  HIG-10-003 [C]
- 2010 ◇ *Observation of WW final state* EWK-10-009 [C]
- 2015 ◇ *Measurement of the transverse momentum spectrum of the Higgs boson produced in pp collisions at  $\sqrt{s} = 8$  TeV using the  $H \rightarrow WW$  decays* HIG-15-010 [R - Higgs to WW]
- 2014 ◇ *Measurements of the differential cross section of single top-quark production in the t channel in proton-proton collisions at  $\sqrt{s} = 8$  TeV* TOP-14-004 [R - Single top]

- ◊ *Search for anomalous  $Wtb$  couplings and top FCNC in t-channel single-top-quark events* TOP-14-007 [R - Single top]
- ◊ *Search for anomalous single top quark production in association with a photon* TOP-14-003 [R - Single top]
- ◊ *Search for s-channel single top-quark production in pp collisions at  $\sqrt{s} = 8\text{TeV}$*  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* TOP-12-002 [R - Single top]
- ◊ *Search for Flavor-Changing Neutral Currents in tZ events in proton-proton collisions at  $\sqrt{s} = 7\text{TeV}$*  TOP-12-021 [R - Single top]
- ◊ *Measurement of the single-top t-channel charge ratio at 8 TeV* TOP-12-038 [R - Single top]
- ◊ *Measurement of W-helicity fractions in single top events topology* TOP-12-020 [R - Single top]

There are more publications and results of which I am also an author. For details consult my publication list.

## 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 2011 and of the *Build your own accelerator* in 2015
- **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 Ballexert 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

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

Rebeca Gonzalez Suarez, January 6, 2016