

Current position

Researcher at Department of Physics and Astronomy, High Energy Physics, Uppsala University, Funded by individual Starting Grant from the Swedish Research Council, Member of the ATLAS collaboration at CERN.

Since August, 2018.

Former member of the CMS Collaboration from 2006 to 2018

Previous positions

2012-2018 **Adjunct Research Associate**, *University of Nebraska, Lincoln*, US.

2010-2012 **Post-doctoral fellow**, *Vrije Universiteit Brussel (VUB)*, BE.

2006-2010 **PhD Student**, *Instituto de Fisica de Cantabria (IFCA)*, ES.

Education

2010 **Ph.D**, (9 September), *University of Cantabria*, ES.

2007 **DEA, Diploma de Estudios Avanzados**, *University of Cantabria*, ES.

2005 **Degree in Fundamental Physics**, *Universidad de Oviedo*, ES.

Ph.D Thesis

title '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' [link]

supervisors J. Cuevas and T. Anoro

Grants and awards

2018 **Vetenskapsrådet Starting Grant**, *Swedish Research Council, Individual*, Uppsala University, SE.

2017 **Future Fellowship Grant**, *Australian Research Council, Individual*, University of Adelaide, AU.

Coordination, Leadership

- **Top convener.** Coordinator of the top quark Physics Analysis Group of the CMS experiment. Level 2 management within the CMS collaboration. Physics coordination. [2016-2018]
- **Higgs to WW convener.** Coordinator of the Higgs to WW physics in the CMS experiment. Level 3 management within the CMS collaboration. Higgs group. [2015-2016]
- **Single Top convener.** Coordinator of single-top-quark related physics in the CMS experiment. Level 3 management within the CMS collaboration. Top group. [2013-2014]
- **Run Field Manager.** Coordinating the operations of the CMS experiment on-site in LHC point 5, link between the shift crews and Run coordination. [2015-2017]

Other responsibilities

- **Contact person.** Monte Carlo Simulation, Higgs to WW subgroup, CMS experiment. [2014-2015]
- **Contact person.** Local reconstruction of the Strip Tracker, CMS experiment. [2011-2012]
- **Contact person.** High Level Trigger for the Strip Tracker, CMS experiment. [2011-2012]
- Editor and analysis contact of arXiv:1411.3441 (PRD), arXiv:1209.3489 (PRL), TOP-11-022, and HIG-14-012.
- **Analysis Review Committees.** Member of 22 internal editorial boards in the CMS experiment, **chair of 6** of them. Most appointed postdoc in this kind of committees in CMS at the time. [2011 to 2016]
- **External Reviewer** for research grants submitted to different funding programs in Europe and Asia. [2016-2018]
- **Referee.** European Physical Journal C. [2018]

Participation in Thesis Boards

2018 **PhD thesis committee**, (13th - December), Uppsala University, SE.

'Isomeric yield ratio measurements with JYFLTRAP: In quest of the angular momentum of the primary fragments' by Vasileios Rakopoulos. **Chair person** of the examination committee.

2018 **PhD thesis committee**, (9th November - 18th December), Bristol University, UK; and Vrije Universiteit Brussel, BE.

'Precision measurements of differential $t\bar{t}$ production cross sections as a function of kinematic event variables at 13 TeV at CMS' by Douglas John Paul Burns.

2018 **PhD thesis committee**, (12th October), Uppsala University, SE.

'Enhancing the performance of the Digital Cherenkov Viewing Device - Detecting partial defects in irradiated nuclear fuel assemblies using Cherenkov light' by Erik Branger.

2018 **PhD thesis committee**, (19th March), Vrije Universiteit Brussel, BE.

'Direct measurement of the top quark decay width in the muon+jets channel using the CMS experiment at the LHC' by Lieselotte Moreels.

2016 **PhD thesis committee**, (16th September), IUT de Colmar, FR.

'Recherche d'événements monotop dans le canal leptonique avec l'expérience CMS du LHC' by Michael Buttignol.

2015 **PhD thesis committee**, (20th March), Uppsala University, SE.

'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), Vrije Universiteit Brussel, BE.

'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

2018 **Uppsala University**, *'At the top of the Large Hadron Collider'*, (6 September), Uppsala, SE.

2017 **Workshop on top physics at the LC 2017**, *'Recent LHC results'*, (8 of June), CERN, CH.

University at Albany, *'It is not lonely at the top: studying the heaviest quark at the LHC'*, (16 of February), Albany, NY, US.

University of Kansas, *'It is not lonely at the top: studying the heaviest quark at the LHC'*, (23 January), Lawrence, KS, US.

2016 **University of Zurich**, *'Top quark physics in Run 2 with the CMS experiment'*, (5 December), Zurich, CH.

UK HEP Forum, *'Top physics'*, (3 November), Abingdon, UK.

Teilchenkolloquium - Particle Physics Colloquium at University of Heidelberg, *'Top quark physics at 13 TeV with the CMS experiment at the LHC'*, (5 July), Heidelberg, DE.

2015 **Stony Brook University**, *'Top quark and Higgs boson physics at the LHC'*, (17 December), Stony Brook, NY, US.

Wine & Cheese: Fermilab Joint Experimental - Theoretical Physics Seminar, *'Recent Results from CMS on Top and Higgs'*, (20 November), Fermilab Batavia, IL, US.

LPC Physics Forum, *' $H \rightarrow WW$ at CMS'*, (13 August), Fermilab Batavia, IL, US.

University of Nebraska, Lincoln, *'Higgs boson decays to WW at CMS'*, (10 August), Lincoln NE, US.

University of Goettingen, II. Physikalisches Institut, *'Overview of single top physics in CMS with Run-1 data'*, (19 June), Goettingen, DE.

- Universite Catholique de Louvain**, '*Is it the Higgs? Characterization of the $H(125)$ resonance (spin, parity, tensor structure) with leptonic WW decays*', (18 March), Louvain la Neuve, BE.
- EPFL Lausanne**, '*Overview of single top physics in CMS with Run-1 data*', (2 March), Lausanne, CH.
- 2014 **CERN Collider Cross Talk**, ' *$H \rightarrow WW$ from ATLAS and CMS*', (27 November), CERN, CH.
- LHC seminar**, '*Recent top physics results from CMS*', (25 February), CERN, CH.
- 2013 **Uppsala University**, '*Overview of single top results at the LHC*', (10 October), Uppsala, SE.

Conferences

- 2018 **IMFP 2018 - XLVI International Meeting on Fundamental Physics**, *Invited Talk: 'Top Quark Physics Summary'*, (9-13 April), Salamanca, ES.
- Aspen 2018 - The Particle Frontier**, *Plenary Talk: 'LHC results on Top Quark Physics'*, (25-31 March), Aspen, CO, US.
- Top Quark Physics at the Precision Frontier**, *Chair of the workshop*, (16-19 Jan), Fermilab Batavia, IL, US.
- 2017 **TOP2017: 10th International Workshop on Top Quark Physics**, *Member of the **International Advisory Committee** and Chair of the session: Differential Top Quark Pair Production*, (17-22 Sep), Braga, PT.
- LHCP 2017: The Fifth Annual Large Hadron Collider Physics conference**, *Chair of the TOP Parallel sessions*, (14-20 May), Shanghai Jiao Tong University, CN.
- 2016 **TOP2016: 9th International Workshop on Top Quark Physics**, *Chair of the session: Latest Results from ATLAS and CMS*, (19-23 Sep.), Olomuc, CZ.
- Third CMS Single Top Workshop**, *Organizing Committee, Scientific Program*, (2-3 Jun), Strasbourg, FR.
- APS April 2016: American Physical Society April Meeting 2016**, *Invited Plenary Talk: 'Higgs Physics at the LHC'*, (16-19 Apr), Salt Lake City, UT, US.
- 2015 **DPF2015: Meeting of the Division of Particles and Fields of the American Physical Society**, *Invited Parallel Talk: 'Run-1 Single-top measurements at CMS'*, (4-8 Aug), University of Michigan, Ann Arbor, MI, US.
- SM@LHC: Standard Model at LHC**, *Plenary Talk: 'LHC results on Spin, Anomalous Couplings, and CP structure'*, (21-24 Apr), Galileo Galilei Institute, Florence, IT.
- 2014 **Second CMS Single Top Workshop**, *Scientific Program and Talk: 'Lessons learned from Run1 and future prospects'*, (4-5 Dec), Naples, IT.
- LHCP 2014: The Second Large Hadron Collider Physics conference**, *Chair of the TOP Parallel sessions*, (2-7 June), New York City Columbia University, US.
- 2013 **CMS Single Top Workshop**, *Scientific Program and Closing Talk: 'Next steps and summary'*, (19-20 Dec), Naples, IT.
- TOP2013: 6th International Workshop on Top Quark Physics**, *Plenary Talk: 'Inclusive single top cross section at the LHC'*, (4-19 Sep), Durbach, DE.
- 2012 **4th generation and single-top: Workshop on fourth fermion generation and on single-top production**, *Invited Talk: 'tW production at CMS'*, (26-28 Mar), Leinsweiler, DE.
- Rencontres de Moriond - QCD and High Energy Interactions**, *Plenary Talk: 'Single Top Production at $\sqrt{s} = 7\text{ TeV}$ '*, (10-17 Mar), La Thuile, IT.
- 2010 **II CPAN days: Segundas Jornadas del CPAN**, *Invited Plenary Talk: 'Higgs and SUSY searches in CMS'*, (29-30 Nov), Valencia, ES.
- 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 Jun), Perugia, IT.
- 2009 **PASCOS 2009: 15th International Symposium on Particles Strings and Cosmology**, *Parallel Talk: 'EW symmetry breaking at the LHC'*, (6-10 Jul), Hamburg, DE.

- 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', (Jul 29 - Aug 5), Philadelphia, Pennsylvania, US.
- 2007 **CHEP07: International Conference on Computing in High Energy and Nuclear Physics**, Poster (co-author): 'A software and computing prototype for CMS Muon system alignment', (2-7 Sep), Victoria BC, CA.

Publications

- Signing author of the CMS Collaboration papers from 2007 to 2019.
 - Currently qualifying for authorship in ATLAS.
- During my two years as top quark Physics Analysis Group coordinator at the CMS experiment [2016-2018]:
 - **53 results were made public, of which 32 were articles submitted to journals.**
 - The top quark group in CMS has submitted 90 papers (November 2018) to journals since the Run-1 of the LHC started, so about 35% of the total publications of the group were submitted during my convenership. I was the 12th convener of the group
 - The list of results is available in this [link].
- During my Higgs to WW sub-convenership [2014-2016], 2 papers were submitted to journals: arXiv:1606.01522-JHEP 03 (2017) 032 which was the **500th paper of CMS**, and arXiv:1605.02329-JHEP 09 (2016) 051, as well as seven preliminary results.
- During my single top quark sub-convenership [2012-2013], 7 papers were submitted to journals, and 10 preliminary results made public.

Analysis Contact, Primary Author, Editor

- 2017 **Recent CMS results in top and Higgs physics**, arXiv:1707.05054, Modern Physics Letters A, 2, Vol. 32, No. 29 (2017) 1730026.
- 2015 **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 (2015).
- 2014 **Observation of the associated production of a single top quark and a W boson in pp collisions at $\sqrt{s} = 8\text{TeV}$** , arXiv:1401.2942, Phys. Rev. Lett. 112, 231802 (2014)..
- Measurement of Higgs boson production and properties in the WW decay channel with leptonic final states**, arXiv:1312.1129, JHEP 01(2014)096.
- 2013 **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).

Substantial Contribution

- 2016 **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**, arXiv:1606.02266, JHEP 1608 (2016) 045.
- 2015 **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, JHEP06(2016)177.
- 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.
- 2013 **Snowmass 2013 Top quark working group report**, arXiv:1311.2028.
- Observation of a new boson with mass near 125 GeV in pp collisions at $\sqrt{s} = 7$ and 8 TeV**, arXiv:1303.4571, JHEP 1306 (2013) 081.
- 2012 **Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC**, arXiv:1207.7235, Phys.Lett. B716 (2012) 30-61.
- Search for the standard model Higgs boson decaying to a W pair in the fully leptonic final state in pp collisions at $\sqrt{s} = 7\text{ TeV}$** , arXiv:1202.1489, Phys.Lett. B 710 (2012) 91-113.
- 2011 **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.

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.

Conference Proceedings

- 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

Primary Author, Editor

- 2016 **First results on Higgs to WW at $\sqrt{s} = 13$ TeV**, *HIG-15-003*.
- 2014 **Constraints on Anomalous HWW Interactions using Higgs boson decays to $W+W-$ in the fully leptonic final state**, *HIG-14-012*.
- 2012 **Observation of Associated Production of a Single Top Quark and W Boson in pp Collisions at $\sqrt{s} = 8$ TeV**, *TOP-12-040*.
- 2011 **Search for single top tW associated production in the dilepton decay channel in pp collisions at $\sqrt{s} = 7$ TeV**, *TOP-11-022*.
- 2010 **Performance of muon identification in pp collisions at $\sqrt{s} = 7$ TeV**, *MUO-10-002*.
- 2008 **Search Strategy for a Standard Model Higgs Boson Decaying to Two W Bosons in the Fully Leptonic Final State**, *HIG-08-006*.
- 2007 **Search for the Higgs boson in the WW decay channel with the CMS experiment**, *HIG-07-001*.

Substantial Contribution

- 2017 **Higgs to WW measurements with 15.2 fb^{-1} of 13 TeV proton-proton collisions**, *HIG-16-021*.
- 2016 **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-15-019*.
Search for ttH production in multilepton final states at $\sqrt{s} = 13$ TeV, *HIG-15-008*.
- 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*.
- 2014 **Search for $H \rightarrow b\bar{b}$ in association with single top quarks as a test of Higgs boson couplings**, *HIG-14-015*.
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*.
Constraints on anomalous HVV interactions using H to 4l decays, *HIG-14-014*.
- 2011 **Measurement of the top-quark pair-production cross section in the lepton+jets channel with the use of b-tagging**, *TOP-10-003*.
Measurement of the top-quark pair-production cross section in the di-lepton channel at 7 TeV, *TOP-10-005*.
- 2010 **Search for $H \rightarrow WW \rightarrow 2l 2\nu$** , *HIG-10-003*.
Observation of WW final state, *EWK-10-009*.

Outreach Activities

- CERN Facebook live from the LHC tunnel, February 28 2018 [link].
- **Official CERN** and **CMS guide** with more than 100 visits underground, including virtual visits for international audiences.
- **CERN contact** of the Expanding your horizons (EYH) event in Geneva: 2015-2013. Organizer of the 4 CERN workshops. Workshop leader of the *Build your own accelerator* session in 2015.
- Workshop leader of the *Questions without answers at the LHC* session in the EYH event in Geneva in 2011.
- **Moderator** of the International Masterclasses by the International Particle Physics Outreach Group (IPPOG) (2015-2017).
- CMS Guide, school@CMS (2016-2015).
- *Ask a scientist* in the night of the Researchers (FNAC Rive Geneva 2014, FNAC Balaxert Geneva 2015).
- Invited speaker at the *International School of Geneva* International Day of Women and Girls in Science, February 9, Geneva (CH) (2018).
- Invited speaker at the *Agrupación Astronómica de Madrid (AAM)* Seminar: 'Buscando nueva física en el LHC: qué hay después del Higgs?', March 14 (2017), Madrid, Spain.
- Invited speaker at the *Collège du Léman* International Day of Women and Girls in Science, February 10, Geneva (CH) (2017).
- Invited speaker at the 'XXV Jornadas de Astronomía' of the science society *Aranzadi*. Seminar: 'Puede el LHC producir materia oscura? Partículas elementales y el límite entre micro y macro cosmos'. 4 October 2016, San Sebastián, Spain [link].
- *Particle Fever* movie meet and greet in the University of Columbia (NY) (2014).
- Guest speaker at ENP Ferney for gender awareness training (2012).
- CERN Facebook Live from the LHC tunnel [link], February 2018.
- Video interview for the 'Fundación AQUAE' [link], October 2017.
- Appearance in 'Informativos Telecinco' [link], January 1st, 2017.
- Appearance in the Spanish TV program about science 'El cazador de cerebros', 29 October 2016.
- Role in the April Fools' Day video from CERN [link] (2016).
- 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).
- Spanish subtitles for the CMS introduction video, [link].
- Different activities within the Spanish Teacher Programme at CERN (also Swedish).
- CMS guide for the Global Science Opera 'Ghost Particles' (2016).
- Member of the jury for the *I Premio Premio José Ramón Lueje de Investigación y Comunicación*, science communication awards for high school students, Cangas de Onís, Asturias (2015).
- Contributions to the International Particle Physics Outreach Group (IPPOG) website.
- *CMSVoices* Twitter account of February 2016.
- Contributions to the CMS blog: *the Cylindrical Onion*.
- Personal blog with CERN pictures, *lonelychairsatcern.tumblr.com* (20K followers).

Other Activities


Supervisor of summer students at CERN in 2012 (Isis Marina Van Parijs) and co-supervisor in 2013 (Ivan Shvetsov), both projects related to single top physics.

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** (2012-2017) shifts, and **Run Field Manager** (2015-2017)

Member of pannels:

- 103rd Plenary ECFA meeting at CERN (link) [2018].
- Spanish teacher program at CERN [2017].

- Member of the Swedish Physics Society (Svenska Fysikersamfundet).
- Member of the Royal Spanish Society of Physics (RSEF).
-  International Fellow of the Explorers Club (Western Europe Chapter).
- Member of the steering panel of Art@CMS (2017-2018).
- Member of the 'Jurado Joven', 44 edition of the Gijón Film Festival (2006).

