

Andrey Pozdnyakov

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Current position

2015 – 2017

- Postdoctoral fellow at National Central University, TW.
Based at CERN I do my science on CMS experiment at the LHC.

Education

- **PhD, December 2015:** 2008 – 2015
Northwestern University.
Title of the dissertation: *Search for the Higgs Boson Decays to a Photon and Two Leptons with low Dilepton Invariant Mass* [1]. Advisor: Mayda Velasco
- **MS, June 2008:** 2006 – 2008
Moscow Institute of Physics and Technology (MIPT), jointly with
Institute for Theoretical and Experimental Physics (ITEP).
Title of the MS dissertation: *Impact of the Parton Distribution Functions at small x on the spectra of hadronic jets*. Advisor: Vladimir Gavrilov
- **BS, June 2006:** 2002 – 2006
Moscow Institute of Physics and Technology.
Title of the BS thesis: *Detecting a Higgs boson with high mass at LHC, Monte Carlo simulations*.
Advisor: Vladimir Gavrilov
- Summer schools:
 - *Summer 2012*: Hadron Collider Physics Summer School, Fermilab
 - *Summer 2007*: CERN Summer Program

Talks given at the Conferences

- **18 Jan. 2016:** HH searches with CMS workshop, Lyon, France.
Presentation on *Photons* (CMS internal).
- **18 Sep. 2014:** Physics in Collision symposium, Bloomington, USA
Plenary **talk**: *Fermionic Decays of SM Higgs*, Ref. [3].
- **06 Jul. 2014:** LHCP-2014, New-York. Presented a **poster**: *Search for a Higgs boson decaying into $\gamma^*\gamma \rightarrow \mu\mu\gamma$ with dilepton mass below 20 GeV in pp collisions at $\sqrt{s} = 8$ TeV*.

- **22 Apr. 2013:** Workshop on CMS Beam Conditions, Radiation Monitoring and Luminosity Systems, DESY. Gave a **talk:** *BPTX 2012/2013 Scope-Based Algorithms and Running Stability*.
- **07 Feb. 2011:** Minimum Bias and Underlying Event LHC Working Group, CERN. Presented a **talk:** *CMS update on Minimum Bias results*.

Talks given in the CMS meetings

- I made more than a 100 presentations in CMS meetings including the pre-approval talks for three analyses and the approval talks for two analyses.

Contribution to the CMS experiment

I am a member of the CMS experiment since 2006. Here is a list of my most significant contributions:

- Spring 2016: I am commissioned the BPTX subsystem the new Run of the LHC.
- 2015: I commissioned and supported the BPTX subsystem throughout Run-2 of CMS operation.
- 2014 – 2015: I am a contact person for MC production in the Higgs group (for $H \rightarrow \gamma^* \gamma \rightarrow \ell \ell \gamma$ subgroup).
I was also the main contributor to $H \rightarrow \gamma^* \gamma \rightarrow \ell \ell \gamma$ analysis at $\sqrt{s} = 8$ TeV dataset. [2, 4, 9, 10].
- 2012 – 2013: Worked on $H \rightarrow ZZ \rightarrow 4l$ decay and explored the multi-class MVA tools in TMVA for the purpose of spin/parity hypothesis separation of the Higgs boson [5, 12].
- 2011 – 2013: I was responsible for operation of the BPTX system, which provides Beam trigger signals to L1 and BRM subsystems, as well as the real time measurement of the beam timing at the interaction point: $\Delta t(b_1 - b_2)$ [11].
- 2010 – 2012: I was involved in $H \rightarrow ZZ \rightarrow 2\ell 2\nu$ analysis [6, 13], where I contributed to data-driven methods for $t\bar{t}$ background estimation, clean up of the “detector noise” events, performance study of various Missing Energy variable definitions and optimization of the analysis selection.
- 2010 – 2011: Performed the measurement of charged tracks multiplicity (a.k.a. $dN/d\eta$) [7], requested by the LHC Minimum Bias and Underlying Event LHC Working Group for the purpose of comparison between CMS, ATLAS and Alice experiments; this result is also used for MC generators tuning (included in Rivet tool).
- 2010 – 2011: Measuring the event rate and cross section of events with one or more central tracks, for the purpose of comparing it with other experiments and possible use for luminosity measurements [8].
- 2008 – 2010: Helped to perform calibration of the Hadronic Calorimeter with isolated tracks [14]. I wrote a piece of code that collected information of the tracks and HCAL hits needed as an input to minimization algorithm. I was also an expert for the HCAL conditions monitoring and maintaining its data base.
- 2009 – 2012: I have done numerous central shifts for DQM, Trigger and BRM systems, including the *on-call expert* shifts for the BRIL group.

Teaching Experience

- 2016, Feb. 11–21: Facilitator at the CMS Data Analysis school in Taipei.
- 2009 – 2010, 2013 – 2014: Teaching Assistant at Northwestern University, instructor for the laboratory classes and discussion sessions.
- 2004 – 2005: Mathematics teacher at the weekend class for gifted kids.

Other Skills

Languages: native Russian, fluent English, French: A2

Software: C/C++, Python, Java, Shell/Bash

ROOT, Pythia6, Pythia8, MadGraph, Powheg, MCFM, CMSSW;

Arduino, Android-SDK

Hardware: VME and NIM electronics;

AFM/SEM and nano-lithography technology

List of Publications (with significant personal contribution)

- [1] Andrey Pozdnyakov, “Search for the Higgs Boson Decays to a Photon and Two Leptons with Low Dilepton Invariant Mass”, Northwestern University, 2015, CMS-TS-2016-001, CERN-THESIS-2015-256, [arXiv:1601.00790]
- [2] “Search for a Higgs boson decaying into $\gamma^*\gamma$ to $\ell\ell\gamma$ with low dilepton mass in pp collisions at $\sqrt{s} = 8$ TeV”, CMS Collaboration, Phys. Lett. B, CMS-HIG-14-003, CERN-PH-EP-2015-137, doi:10.1016/j.physletb.2015.12.039, Dec. 2015, [arXiv:1507.03031]
- [3] “Fermionic Decays of SM Higgs”, Andrey Pozdnyakov, Conference Report, CMS-CR-2014-363, Sep. 2014, [arxiv:1411.1981]
- [4] “Search for a Higgs boson decaying into $\gamma^*\gamma \rightarrow \mu\mu\gamma$ with dilepton mass below 20 GeV in pp collisions at $\sqrt{s} = 8$ TeV”, CMS Collaboration, CMS-PAS-HIG-14-003, Mar. 2014
- [5] “Measurement of the properties of a Higgs boson in the four-lepton final state”, CMS Collaboration, Phys. Rev. D **89**, 092007 (2014) [arXiv:1312.5353]
- [6] “Search for the standard model Higgs boson in the $H \rightarrow ZZ \rightarrow 2\ell 2\nu$ channel in pp collisions at $\sqrt{s} = 7$ TeV”, CMS Collaboration, JHEP **03**, 040 (2012) [arXiv:1202.3478]
- [7] “Pseudorapidity distributions of charged particles in pp collisions at $\sqrt{s} = 7$ TeV with at least one central charged particle”, CMS Collaboration, CMS-PAS-QCD-10-024, Apr. 2011
- [8] “Luminosity Study: Events Selected with a Central Track” Andrey Pozdnyakov, Michael Schmitt, Mayda Velasco, CMS-DP-2011-004 *Public Presentation*, 12 Jun. 2011

CMS internal Notes

- [9] Andrey Pozdnyakov, Chia-Ming Kuo, et al., “Searches for a Higgs boson decaying into a $\gamma^*\gamma$ to a dilepton plus a photon in pp collisions at a center of mass energy of 8 TeV”, CMS AN-2014/211
- [10] Andrey Pozdnyakov and Stoyan Stoynev, “Search for a Higgs boson decaying into $J/\Psi + \gamma$ in pp collisions at $\sqrt{s} = 8$ TeV”, CMS AN-2013/335
- [11] Andrey Pozdnyakov, Jeroen Hegeman, Anne Dabrowski, “BPTX electronics and software at CMS”, *CMS Internal Note*, CMS-IN-2013/010, CERN
- [12] G. Bauer, et al., “Examination of an excess of events in the search for the standard model Higgs boson in the $H \rightarrow ZZ^* \rightarrow 4\ell$ channel”, CMS AN-2012/414
- [13] Joe Bochenek, et al., “Search for the Higgs boson in the $H \rightarrow ZZ^* \rightarrow 2\ell 2\nu$ decay channel in pp collisions with the CMS detector”, CMS AN-2012/138
- [14] A. Anastassov et al., “Single Particle Response in the CMS Calorimeter”, CMS AN-2010/179