Hyunyong Kim

Curriculum Vitae

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Date of birth: 02/25/1984

EDUCATION

MAR 2010 – AUG 2018 **Ph.D.**, *Experimental particle physics*, Advisor: Inkyu Park.
Department of Physics, University of Seoul, Seoul, Rep. of Korea

MAR 2008 – FEB 2010 **Master**, *Experimental particle physics*, Advisor: Inkyu Park.
Department of Physics, University of Seoul, Seoul, Rep. of Korea

CURRENT POSITION

APR 2018 to date **POSTDOCTORAL**.
Mitchell Physics Building, 4242 TAMU, 578 University Dr, College Station, TX 77843, USA

PREVIOUS POSITIONS

AUG 2018 to APR 2019 **POSTDOCTORAL**.
Nature Science Research Center, University of Seoul, Seoul, Rep. of Korea

JUL 2015 – MAY 2018 **Ph.D. Student**, *Korea CMS (KCMS)*, CERN, Geneva, Switzerland.
Based on CERN three years with Korea CMS funding. I successfully finished three main task. First one is analysis; my research field is QCD, and my analysis compares the data and the theoretical predictions in the different Monte Carlo method dominant region. The second task is service work; CMS experiment is huge and complex. My service work focused on new muon system GEM. I developed data quality monitoring (DQM) and the raw data reading module with DB. The last one is shift; I did GEM detector on call(DOC) shift and central online DQM shift.

SEP 2010 – FEB 2014 **Assistant researcher**, Korea Institute Radiological & Medical Science (KIRAMS), Seoul, Rep. of Korea.
I spent three and a half years in KIRAMS instead of military service. My specialty is computational physics, and I have done many calculations for the design of beam line facilities. I joined the production of scanning magnet and magnetic field measurement equipment. I measured all design specifications of the scanning magnet and then compared measurement results to simulation results.

FELLOWSHIPS AND AWARDS

APR 2010 **Best Poster**.
Korean Physical Society

MAR 2010 **Hi-Seoul Fellowship**.
Seoul Scholarship Foundation

TRACK RECORD

2019 to date **Four muon final-state SUSY analysis**, *CMS*, Texas A&M University, Texas, USA.
Model-independent new particle search with 4 muons final state.

2019 to date **CMS Muon System Alignment**, *CMS*, Texas A&M University, Texas, USA.
Development and maintenance track-based muon alignment

2017-2018 **CMS GEM Unpacker**, *CMS GEM*, CERN, Geneva, Switzerland.
This GEM unpacker is GEM raw date readout module on the CMS software package (CMSSW). The CMSSW did not have GEM raw data read (unpacker) module. The GEM DAQ team developed the GEM unpacker main code, but it needed porting to CMSSW. Also, I made electronics DB and many other data formats for CMSSW. My primary role was creating a DB file which is the electronics-detector strip mapping and validating it.

2017-2018 **CMS GEM DQM**, *CMS GEM*, CERN, Geneva, Switzerland.
The CMS GEM is a new muon detector system. This new system needs many new components like data quality monitoring (DQM). I have developed on/offline DQM on CMS software package (CMSSW). It needs to understand the DAQ system and CMSSW as well. The online DQM is running at LHC point 5, and it shows many electronics status in the real time. This GEM online DQM module has been written from scratch and tested of the operation, so it currently includes essential occupancy, cluster size, and electronics status plots. The operation of this online DQM is ongoing now successfully.

2016-2017 **CMS GEM cosmic ray stand**, *CMS GEM*, CERN, Geneva, Switzerland.
The GEM QC8 (cosmic ray stand) is final quality control of GEM detector. This cosmic ray stand has measured the GEM detector efficiency with the reconstructed track. My role was making analysis code in CMS software package (CMSSW) and analyzing the QC8 data. The analysis code reconstructs cosmic muon track with test chambers and then this track measures the efficiency of an excluded the chamber when tracking reconstruction. After this task, I could understand the detector DAQ flow and the characteristic of the gaseous detector.

2016-2018 **Multi-jet correlations**, *CMS SMP-J*, CERN, Geneva, Switzerland.
This multi-jet correlation analysis measured the angular and momentum correlations between the 2nd jet and the 3rd jet at dijet events. The ΔR of the 2nd jet and the 3rd jet represents parton radiation angle. So, this radiation angle is effected color (QCD) coherence. Also, the transverse momentum ratio of the 2nd jet and the 3rd jet shows that the parton radiation is hard or soft. This analysis shows the performance of the theoretical predictions in different Monte Carlo method (metrics element vs. parton shower) dominant regions.

2014-2016 **Color coherence**, *CMS SMP-J*, CERN, Geneva, Switzerland.
The $\sqrt{s} = 7$ TeV color coherence analysis was performed by my institution. After finished $\sqrt{s} = 7$ TeV analysis, I started $\sqrt{s} = 8$ TeV and 13 TeV analysis. The color coherence effect sensitive variable has many other kinematic effect, so this analysis has been terminated. However, I have updated the theoretical predictions of $\sqrt{s} = 7$ TeV analysis. That update has shown greatly improvement of MC models and I published this results.

2010-2014 **Scanning beam irradiation line R&D**, *KHIMA*, KIRAMS, Seoul, Rep. of Korea.
This project is developing and researching of the active scanning technique which is a pencil beam delivery method in particle therapy. I designed the scanning magnet and calculated beam scanning simulation with Geant4. Also, I measured all design specifications of the scanning magnet. After commissioning, 50 MeV proton scanning beam irradiation was performed successfully.

2009-2010 **Jet algorithm comparison**, *KCMS*, Uni. of Seoul, Seoul, Rep. of Korea.
The jet analysis uses MC data. Full chain simulation generated the MC data with PYTHIA6 on CMSSW. In the CMSSW, there are several Jet-Finders. Comparison with the generated jets and the reconstructed jets gives detector energy resolution and geometry effects. Jet finder algorithms comparing shows jet finder efficiency. This study would be helpful for the QCD research.

2008-2009 **FDTD software development for photonic crystals**, *Quantum Photonic Science Research Center*, Hanyang Uni., Seoul, Rep. of Korea.
This research studied the photonic crystal with measurement and theoretical calculations. My primary role was the calculation of simulation with the Finite-difference time-domain (FDTD) method because my specialty is computational physics. I wrote the simulation code from scratch on the MATLAB.

TALKS

JUN 2021 **Measurements of angular distance and momentum ratio distributions in three-jet and Z + two-jet final states in pp collisions**, ***Cavendish HEP Seminars***, University of Cambridge (ZOOM).

APR 2021 **The CMS GEM commissioning and alignment status**, ***APS April 2021***, Virtual World, United States.

JAN 2021 **Track-based muon system alignment of the CMS detector** , ***ICHEP2020***, Prague (Virtual conference), Czech Republic.

APR 2020 **Triple-GEM (GE1/1) Muon System for the CMS Phase II Upgrade: Commissioning and Prospects**, *APS April 2020*, Washington, DC, United States.

JUL 2018 **Measurements of event properties and correlations in multijet events in CMS**, ***ICHEP2018***, Seoul, Rep. of Korea.

APR 2015 **The Color Coherence**, ***KPS 2015 Spring***, Daejeon, Rep. of Korea.

OCT 2014 **Color coherence at 8 TeV**, ***2014 KPS Fall***, Gwangju, Rep. of Korea.

PHYSICS SCHOOLS

APR 2018 **Physics at the terascale Monte Carlo school**, ***MC school***, DESY, Hamburg, Germany.

AUG 2017 **GEM facilitator, CMS, physics object school**, ***CMS POS***, INFN Bari, Bari, Italy.

JUL 2015 **Jet facilitator, CMS data analysis school at Korea**, ***CMS DAS***, KNU, Daegu, Rep. of Korea.

NOV 2014 **CMS Upgrade school**, ***CMS CUPS***, DESY, Hamburg, Germany.

SELECTED PUBLICATION LIST

SEP 2021 **Measurements of angular distance and momentum ratio distributions in three-jet and Z + two-jet final states in pp collisions**, *Eur. Phys. J. C 81, 852 (2021)*.

JAN 2021 **Track-based muon system alignment of the CMS detector** , *PoS ICHEP2020*.

AUG 2019 **Measurements of event properties and correlations in multijet events in CMS** , *PoS ICHEP2018*.

2017 ***Monte Carlo Updates on Color Coherence at 7 TeV***, *JKPS, 70.5 (2017): 465-468*.
This study looked latest MC performance for color coherence effect. The $\sqrt{s} = 7\ TeV$ CMS color coherence research shown most MC could not describe data well. So, we had interesting of current MC and their performance. My primary contributions were setup MC software and generating MC with published rivet plugin.

2015 ***Preliminary Results, Obtained by Using a Proton Beam, for an Active Scanning System to Installed on the KHIMA***, *JKPS, 67.3 (2015): 581-589*.
This paper is the results of the fast scanning beam irradiation system for hadron therapy. My contribution was designing and commissioning the scanning magnet. Also, I was implementing of magnet field map to GEANT4 and assuming SOBP for carbon beam.

2009 ***Detailed Treatment of the Nonlinear Optical Properties of Nonlinear Photonic Crystals***, *JKPS, 55.3 (2009): 1237-1242*.
This paper studied the photonic crystal with measurement and theoretical calculations. My primary role was calculation optical simulation with the Finite-difference time-domain (FDTD) method because my specialty is computational physics. I wrote the simulation code from scratch on the MATLAB.

THESIS

2018 **Ph.D. Thesis**, ***Measurement of angular and momentum distributions in multi-jet final states in pp collisions at $\sqrt{s}$ = 8 and 13 TeV at the LHC***.

2010 **Master Thesis**, ***Comparison of Jet algorithms with pp collisions at LHC***.

COMPUTING SKILLS

Languages C++ (Advanced), Python (Advanced), MATLAB, Arduino, Fortran, Java, Javascript

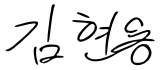
Software LaTeX, OPERA 3D, COMSOL, Keras (+TensorFlow)

LANGUAGES

Korean **Mother tongue**

English **Fluent (OPIc Advanced Low)**

College Station, November. 23. 2021
Regards,



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