DR. ANDREAS JUNG Assistant Professor Physics & Astronomy ● anjung@purdue.edu ● 765 494 5399

Dr. Andreas Jung is an Assistant Professor in the Department of Physics & Astronomy. He received his Doctorate in High Energy Physics on detector instrumentation and measurements of deep inelastic electron-proton collisions in 2009 from University of Heidelberg, Germany. As a postdoctoral researcher at the Fermi National Accelerator Laboratory near Chicago, IL he worked on silicon-based charged particle detectors used to record proton-anti-proton collisions at the Tevatron particle accelerator. In 2015 he moved to Purdue University and currently works on the upgrade of the silicon detector for the Compact Muon Solenoid experiment at the Large Hadron Collider, the largest particle collider in the world located in Geneva, Switzerland.

Awards

Senior Distinguished Researcher at the Large Hadron Collider Physics Center at Fermilab, Chicago, 2019.

Current Research Focus

Analysis of the proton-proton collision data recorded with the CMS detector at the LHC and development of machine learning algorithms

Large carbon fiber composite light-weight radiation hard support structures for the CMS Detector at the Large Hadron Collider

High thermal conductivity and radiation hard support structure materials for the CMS Detector

Publications

Dr Jung has published scientific papers as a member of large collaborations of physicists that are common in high energy physics experiments, such as the H1, D0 and CMS experiments. A selection is listed below:

- S. Das, A. J. Wildridge, S. B. Vaidya, and A. Jung, *Track clustering with a quantum computer for primary vertex reconstruction at LHC experiments*, submitted to Nuclear Instruments and Methods A [arXiv:1903:08879], 2020.
- A.M. Sirunyan et al. (CMS Collaboration), *Measurement of the top quark polarization and t_t spin correlations in dilepton final states at TeV*, Phys. Rev. D 100, 072002 (2019), doi:10.1103/PhysRevD.100.072002.
- A.M. Sirunyan et al. (CMS Collaboration), *Measurement of the top quark mass in the all-jets final state at TeV and combination with the lepton+jets channel*, Eur. Phys. J. C 79 (2019) 313, doi:10.1140/epjc/s10052-019-6788-2.
- A.M. Sirunyan et al. (CMS Collaboration), *Measurement of the cross section for top quark pair production in association with a W or Z boson in proton-proton collisions at TeV*, JHEP 08 (2018) 011, doi:10.1007/JHEP08(2018)011.
- A.M. Sirunyan et al. (CMS Collaboration), *Precision measurement of the structure of the CMS inner tracking system using nuclear interactions*, JINST 13 (2018) P10034, doi:10.1088/1748-0221/13/10/P10034.
- T. Aaltonen et al. (CDF & D0 collaboration), *Combined Forward-Backward Asymmetry Measurements in Top-Antitop Quark Production at the Tevatron*, Phys. Rev. Lett. 113, 032002 (2018), doi:10.1103/PhysRevLett.120.042001.

Summary of CMS HL-LHC Upgrades

Trigger/HLT/DAQ

- Track information in L1-Trigger
- L1-Trigger: 12.5 ms latency – output 750 kHz
- HLT output 7.5 kHz

Barrel ECAL/HCAL

- Replace FE/BE electronics
- Lower ECAL operating temp. (8 °C)

Muon Systems

- Replace DT & CSC FE/BE Electronics
- Complete RPC coverage in region 1.5<h<2.4
- Muon tagging 2.4<h<3

New Endcap Calorimeters

- Rad. tolerant – high granularity
- 3D capable

New Tracker

- Rad. tolerant – high granularity – significant less material
- 40 MHz selective readout (pT>2 GeV) in Outer Tracker for L1 -Trigger
- Extended coverage to h=4

MIP Precision Timing Detector

- Barrel: Crystal +SiPM
- Endcap: Low Gain Avalanche Diodes