Caleb Fangmeier

Education

2008–2013 **BS**, *Univ. of Nebraska - Lincoln*, Physics, & Computer Science

2013–2016 **MS**, *Univ. of Nebraska - Lincoln*, Physics

2013–2019 **PHD**, *Univ. of Nebraska - Lincoln*, Physics

Doctoral thesis

title *Measurement of the production cross section of four top quarks in proton-proton collisions at 13 TeV*

supervisor Frank Golf

Experience

2013–2020 **Graduate Research Assistant**, *UNL*

- Participated in the construction of the CMS "FPIX" silicon pixel detector with particular contributions to assembly automation and test stand firmware
- Developed control software for gantries used in the production of CMS pixel detector modules; deployed, remotely as well as in person, same software on similar gantries at leading US research institutions
- Designed a particle telescope based on silicon strip detectors
  - Designed readout system around a Cyclone IV FPGA and high frequency ADCs.
  - Laid out PCBs for data acquisition system as well as separate boards for mounting sensors and readout chips.
  - Implemented firmware in Verilog, including a simple RISC processor and memory mapped IO interfaces.
  - Implemented assembler for instruction set used by aforementioned RISC processor.
- Contributed to the reconstruction of electrons at CMS by optimizing the algorithm, implemented in C++, used to match tracks with electromagnetic calorimeter energy deposits

178 Sherman Rd – Chestnut Hill, MA

+1 (402) 768 1358 • *caleb@fangmeier.tech* • *cfangmeier*

2020–2023 **Detector Lab Manager**, *UNL*

- Oversaw day to day lab activities, and provided support to students and post docs which included training on equipment operation, as well as training in the design of software and hardware
- Managed operation of cleanroom, including ensuring regular cleaning as well as upkeep of services and equipment.
- Continued to support the development of the gantry control software
  - Implemented in LabVIEW an interpreter for a BASIC-like command language, gScript, to enable faster and easier development of assembly procedures.
  - Added new visual pattern recognition for automated fiducial marking acquisition.
  - Added database integration for automated tracking of components during production.
- Built and maintained a web-based electronic logbook to track and report lab activities
- Managed small and large purchases of equipment and supplies
- Served as the coordinator of module design and assembly for the ETL detector at CMS which included
  - Refining the module design for increased robustness and ease of assembly
  - Designed fixtures for automated module assembly and worked with machine shop to produce them
  - Designed and procured mock module components, including PCBs, to verify assembly at scale
- Designed thermal mock-up of module with integrated temperature sensing; laid out and procured PCBs for same

2023–Current **Detector Engineer**, *Boston University*

- Continues to lead ETL module assembly efforts as part L3 management responsibilities in the CMS collaboration
- Coordinated startup of new lab at BU focused on particle detector design, assembly, and testing including:
  - Identifying and procuring lab supplies and equipment
  - Building a new gantry-based assembly system and adding compatibility to gScript for the new system
  - Setting up new Hesse wirebonder in lab, designing fixtures to utilize it in module production
- Lead efforts to model the thermal performance of ETL both using simulations and with mockups
- Training students on programming, use of CAD tools, and how to work within the collaboration

Computer skills

Languages	Python, C/C++, LabVIEW, Javascript, Verilog
Libraries	ROOT, OpenCV, NumPy, Matplotlib, Flask, FastAPI, Vue.js
Software	Linux, Git, KiCAD, Autodesk Inventor, Quartus II

178 Sherman Rd – Chestnut Hill, MA
+1 (402) 768 1358 • *caleb@fangmeier.tech* • *cfangmeier*