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EDUCATION

University of Sussex 2013-2017	**Ph.D.**, High Energy Physics
Unversity of Manchester 2009-2013	**MPhys**, Physics with Astrophysics

RESEARCH: The NOvA Experiment, 2013-2017

Reconstruction and Analysis:

• **Thesis:** *An Analysis of Muon Neutrino Disappearance from the NuMI Beam Using an Optimal Track Fitter*, Adviser: Dr. Mark Messier. Graduation date: August, 2015

• Developed multivariate methods for identifying muons and estimating neutrino energies.

• Developed a new clustering algorithm to separate potentially overlapping physics events based on casual relationships between channel hits.

• Enhanced a modified Hough transform to identify major event features used as a first stage in a global vertex identification algorithm.

• Developed a particle tracking module based on a model for multiple scattering capable of fitting tracks under different particle hypotheses.

• Created an analysis package to assign particle identifications to reconstructed tracks using scattering angles, dE/dx values along the track, and reconstructed momenta.

• Performed a Monte Carlo based analysis to determine the potential sensitivity to neutrino oscillations from events entering the detector from outside.

Detector Monitoring and Commissioning:

• Developed a series of online monitoring tools that provide real-time feedback on critical detector performance. These tools display histograms of key variables and provide the ability to generate plots comparing current and previous detector states.

• Created a fully automated series of scripts for nearline processing that produce continually updated metrics posted to a webpage monitored by shifters. This information is also used for data quality purposes to determine good runs and provide bad channel masks for both of the NOvA detectors.

• Installed and maintained software across eight different computers necessary for running the online and nearline monitoring software. This included being the 24-hour on-call expert for all of the data-monitoring software running on

these eight machines for over a year.
• Created the software to map a coordinate system based on electronic hardware elements to physical locations in the NOvA detectors for the data acquisition group.
• Spent one month assisting in the installation of hardware and cabling for the NOvA near detector and prototype detector.

Leadership:
• Served as the elected president of the Young NOvA group (an organization of post-docs, graduate, and undergraduate students designed to promote an increased representation of the younger members within the collaboration), August 2013 - June 2014

ADDITIONAL RESEARCH EXPERIENCE

Long-Baseline Neutrino Facility: 2011-2012
• Assisted with the research and development of plastic bars coated with a wavelength shifting material to be used to capture scintillation light within the LBNF detectors.
Research Assistant, Indiana University Dept. of Physics: 2010
• Created a numerical simulation of a low energy deuteron beam used to model a pyro-electric fusion device.
Research Assistant, Indiana University Dept. of Astronomy: 2000-2001
• Performed computational simulations of gravitationally interacting few-body systems. Independently developed software to analyze the statistics of the results from thousands of different simulations.
Research Assistant, Harvard-Smithsonian Center for Astrophysics: 1998
• Worked with Dr. Peter Garnavich and Dr. Eric Schlegel to analyze the type IIn supernova 1995N by processing and analyzing 25 to 30 photometric and spectroscopic digital pictures.

PRESENTATIONS

• **'Event Reconstruction with the NOvA Far Detector':** Poster presented at the Physics in Collision 2014 conference, September 2014, Bloomington, IN
• **'Event Reconstruction with the NOvA Far Detector':** Poster presented at the Neutrino 2014 conference, June 2014, Boston, MA
• **'Expected Sensitivities from the ν_μ Disappearance Analysis Using the NOvA Detector':** Talk given at the American Physical Society Division of Particles and Fields 2013 conference, August 2013, Santa Cruz, CA
• **'An Analysis of the Peculiar Type IIn Supernova 1995N':** Poster pre-

sented at the 193^{rd} meeting of the American Astronomical Society, January 1999, Austin, TX