Brian Le

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EDUCATION

Doctor of Philosophy in Experimental Particle Physics — Feb 2015 –
The University of Melbourne, Parkville, Victoria, Australia

- Thesis: Probing Higgs boson physics in decays to τ leptons with the ATLAS experiment
- Adviser: Prof. Elisabetta Barberio and Dr. Daniele Zanzi
- Focus: Higgs boson, τ leptons, CP violation, lepton flavour violation, machine learning.

Masters of Science in Physics — Nov 2014 – Mar 2013
The University of Melbourne, Parkville, Victoria, Australia

- Thesis: A multivariate approach to the search for the Higgs boson decaying to τ leptons in the associated production mode in proton-proton collisions with ATLAS
- Adviser: Prof. Elisabetta Barberio
- Focus: Higgs boson, τ leptons, machine learning.
- Graduated with honours
- Subjects Include: Quantum Mechanics, Quantum Field Theory, Particle Physics, General Relativity, Cosmology, Computational Physics, Statistics

Bachelor of Science in Mathematical Physics — Mar 2010 – Nov 2012
The University of Melbourne, Parkville, Victoria, Australia

- Major: Mathematical Physics
- Subjects include: Quantum Physics, Sub-Atomic Physics, Electrodynamics, Statistical Physics, Algebra, Complex Analysis, Metric and Hilbert Spaces, Geometry

PUBLICATIONS

As a registered author on the ATLAS experiment, I am an author on 228 published papers. Below is a selection of relevant works:

JOURNALS

[1] E. Barberio B. Le, E. Richter-Was, Z. Was and D. Zanzi, J. Zaremba, *Deep learning approach to the Higgs boson CP measurement in $H \to \tau\tau$ decay and associated systematics*, *Physical Review D*, vol. 96, no. 7, Jun 2017.
Role: Lead author and main analyst

CONFERENCE PROCEEDINGS, PUBLIC NOTES & OTHER WORKS

[6] ATLAS Collaboration, *Cross-section measurements of the Higgs boson decaying to a pair of tau leptons in proton–proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector*
Presented at the Sixth Annual Conference on Large Hadron Collider Physics, Bologna, Italy, Jun 2018
Paper under review by ATLAS for publication to Journal of High Energy Physics
Role: Main analyst on $\tau_l\tau_{had}$ channel and combined fit until 2017

[5] ATLAS Collaboration, *Measurement of the tau lepton reconstruction and identification performance in the ATLAS experiment using pp collisions at $\sqrt{s} = 13$ TeV*
Role: Main analyst for insitu τ_{had} calibration until 2016

[4] ATLAS Collaboration, *Commissioning of the reconstruction of hadronic tau lepton decays in ATLAS using pp collisions at $\sqrt{s} = 13$ TeV*
Role: Checks for W+jets control region

[3] ATLAS Collaboration, *Search for lepton-flavour-violating decays of the Higgs boson in 13 TeV collisions with the ATLAS Detector*
Paper under review by ATLAS for publication to Physical Review Letters
Role: Training BDT for non-VBF $l\tau_{had}$ channel

[2] E. Barberio, B. Le, E. Richter-Was, Z. Was and D. Zanzi, *Deep learning approach to Measurement Higgs Boson CP in the $H \to \tau\tau$ Decay Channel*, *Acta Physica Polonica B*, vol. 11, no. 3, Jul 2018.
Presented at the Final HiggsTools Meeting: Durham, UK Sep 2017
Role: Lead author, main analyst and presenter

[1] E. Barberio, B. Le, E. Richter-Was, Z. Was and D. Zanzi, *Optimizing Higgs Boson CP Measurement in $\rightarrow \tau\tau$ decay with ML Techniques, Acta Physica Polonica B*, vol. 27, no. 6, Jul 2017.
Presented at the 23rd Cracow Epiphany Conference on Particle Theory Meets the First Data from LHC Run 2 : Krakow, Poland, Jan 2017
Role: Lead author, main analyst and presenter

CONFERENCE

[3] *Search for lepton flavour violation with the ATLAS detector*
Under review by ATLAS for publication
Presented at the 15^{th} International Workshop on Tau Lepton Physics, Amsterdam, Netherlands Sep 2018

[2] *Deep learning approach to the Higgs boson CP measurement in $H \rightarrow \tau\tau$ decay and associated systematics,*
Presented at the Challenges in Photon Induced Interactions, Krakow, Poland Sep 2018

[1] *Optimizing Higgs Boson CP Measurement in $H \rightarrow \tau\tau$ decay with ML Techniques,*
Presented at the 23rd Krakow Epiphany Conference on Particle Theory Meets the First Data from LHC Run 2 : Krakow, Poland Jan 2017

OTHER TALKS & POSTERS

[9] *Optimising Higgs Boson CP Measurement in $H \rightarrow \tau\tau$ decay with Techniques,*
Talk presented at the Collider Cross Talks, CERN, Switzerland Sep 2018

[8] *Optimising Higgs Boson CP Measurement in $H \rightarrow \tau\tau$ decay with Techniques,*
Talk presented at the CoEPP annual meeting, Glenelg, Australia Sep 2018

[7] *Deep learning approach to Measurement Higgs Boson CP in the $H \rightarrow \tau\tau$ Decay Channel,*
Talk presented at the Final HiggsTools Meeting, Durham, UK Sep 2018

[6] *Deep learning approach to Measurement Higgs Boson CP in the $H \rightarrow \tau\tau$ Decays,*
Talk presented at the Third HiggsTools Annual Meeting, Torino, Italy May 2018

[5] *Tag and Probe measurments with $\sqrt{s} = 13$ TeV data,*
Talk presented at the Tau Performance / Higgs to leptons Workshop, CERN, Switzerland Feb 2014

[4] *SM $\rightarrow \tau\tau$ Fitting/Workspace Tools,*
Talk presented at the Tau Performance / Higgs to leptons Workshop, Sheffield, Switzerland Feb 2014

[3] *A multivariate approach to the search for the Higgs boson decaying to τ leptons in the associated production mode in proton-proton collisions with ATLAS,*
Poster presented at the CoEPP annual meeting, Hobart, Australia Feb 2015

[2] *Measurement of Higgs Boson properties with $H \rightarrow \tau_{lep}\tau_{had}$ decays at $\sqrt{s} = 13$ TeV with ATLAS,*
Poster presented at the CoEPP annual meeting, Torquay, Australia Feb 2016

[1] *A multivariate approach to the search for the Higgs boson decaying to τ leptons in the associated production mode in proton-proton collisions with ATLAS,*
Poster presented at the Australian Institute of Physics Meeting, Canberra, Australia Dec 2014

SCHOOLS

2016 Asia-Europe-Pacific School of High Energy Physics, IHEP, Beijing, China, Sep 2016 – Jun 2017

AWARDS & SCHOLARSHIPS

Marie Curie Fellowship: HiggsTools Initial Training Network, Sep 2016 – Jun 2017
- Fellowship for early career researchers. Was employed at Institute of Nuclear Physics in Krakow, Poland for eight months collaborating between theorists and the Belle group.

Poster Competition, CoEPP annual meeting, Torquay 2014
- Best poster at the annual meeting of Australian Particle physicists

Kernot Research Scholarship, School of Physics, The University of Melbourne, Melbourne 2014
- For attaining the highest weighted average of any M.Sc. student continuing to PhD.

EMPLOYMENT & OTHER RESPONSIBILITIES

Marie Curie Fellow: HiggsTools Initial Training Network, Sep 2016 – Jun 2017
Institute of Nuclear Physics (IFJ-PAN), Krakow, Poland
- Collaboration with: Z. Was (theorist), M. Rozanska and A. Bozek (Belle), E. Richter-Was (ATLAS - Jagellonean), R. Jozefowicz (industry - Open AI).
- Responsible for designing and implementing research project into exploring experimental effects on machine learning techniques.

Lab Demonstrator, Mar 2013 – Oct 2014
University of Melbourne, Melbourne, Australia

- Demonstrated laboratory classes for three streams of first year undergraduate physics (fundamentals, standard and advanced). One lab class for eight labs per semester for a total of 60 students.

Tutor, Mar 2015 – Jun 2015
University of Melbourne, Melbourne, Australia

- Taught first year standard physics stream in two classes for 12 weeks for a total of 40 students.

Supervising Students,
I have supervised two students successfully during the research portion of their Masters of Science degree. One from Jageillonian University, Krakow was working on $H \rightarrow \tau\tau$ in the fully hadronic channel has continued on to PhD at IFJ-PAN. Another from Melbourne working on $H \rightarrow \tau\tau$ CP measurement for the upgrade of the LHC to HL-LHC will be moving to PhD at Niels Bohr Institute for a PhD.

KEY SKILLS

LANGUAGES

- English: Native language.
- Japanese: Rudimentary - Six years in high school (speaking, reading, writing).
- Vietnamese: Fluent (comprehension), basic (speaking, reading).

PROGRAMMING

- Languages: Python, C/C++, Bash,
- Data analysis Software: Root, PyROOT, rootpy, numpy, Pandas, Matplotlib
- Repositories: Git, SVN
- Machine Learning: Tensorflow, Keras, TMVA, XGBoost, scikit-learn
- Office Suites/Documentation: LaTeX Microsoft Office, Libre Office, Google Docs
- Operating Systems: MacOS, Windows, Linux,
- Mathematical: MATLAB, Mathematica,

OTHER SKILLS

- Australian Music and Examinations Board: Qualified pianist to Grade 4, music theory to Grade 4
- Qualified lifesaver: Requiring competent level of swimming and resuscetation

REFERENCES

Professor Elisabetta Barberio
Professor of Physics
The University of Melbourne, Melbourne, Australia
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Professor Luca Fiorini
Professor of Physics
Institut de Fisica Corpuscular, Valencia, Spain
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Professor Zbigniew Was
Professor of Physics
Institute of Nuclear Physics - Polish Academy of Sciences, Krakow, Poland
wasm@mail.cern.ch

[*CV compiled on 2018-11-12*]