

Curriculum Vitae

Brian Le

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EDUCATION

Doctor of Philosophy in Experimental Particle Physics Feb 2015 – Feb 2019

The University of Melbourne, Parkville, Victoria, Australia

- Thesis: Probing Higgs boson physics in decays to τ leptons with the ATLAS experiment (**submitted Feb. 2019**)
- 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 2012 – Nov 2010

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 a co-author on 228 published papers (<http://inspirehep.net/author/profile/B.Le.1>). 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 $H \rightarrow \tau\tau$ 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

- [8] ATLAS Collaboration, *Probing the CP nature of the Higgs boson coupling to τ leptons at HL-LHC*
Role: Main analyst and also supervised Masters student
- [7] ATLAS Collaboration, *Search for lepton flavour violation with the ATLAS detector*
Presented at the 15th International Workshop on Tau Lepton Physics, Amsterdam, Netherlands Sep 2018
Role: Author and presenter
- [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 submitted to Physical Review D.
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 $H \rightarrow \tau\tau$ 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*
Presented at the 15th 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 Dec 2016
- [8] *Optimising Higgs Boson CP Measurement in $H \rightarrow \tau\tau$ decay with Techniques*,
Talk presented at the CoEPP annual meeting, Glenelg, Australia Feb 2017
- [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 2017
- [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 2017
- [5] *Tag and Probe measurements 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, UK Oct 2016
- [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 - Jagellonian), 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 Jagellonian 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, SQL
- Data analysis Software: Root, PyROOT, rootpy, numpy, Pandas, Matplotlib
- Repositories: Git, SVN
- Machine Learning: Tensorflow, Keras, TMVA, XGBoost, scikit-learn
- Office Suites/Documentation: L^AT_EX 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 resuscitation

REFERENCES

Professor Elisabetta Barberio

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 The University of Melbourne, Melbourne, Australia
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Professor Luca Fiorini

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 Institut de Fisica Corpuscular, Valencia, Spain
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[CV compiled on 2019-03-07]