Andrew John Lowe

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PROFESSIONAL PROFILE

I am a data scientist with over 15 years' experience working at the forefront of scientific research within large international collaborations. I have a PhD in particle physics and spent several years based at the European Organization for Nuclear Research (CERN) in Geneva and was a member of the team that discovered the Higgs boson, the observation of which led to the award of the 2013 Nobel Prize in Physics. My core competencies include statistical data analysis, machine learning, high-speed real-time data analysis ("big fast data"), quantitative problem solving in cross-functional teams, software development, Monte Carlo simulation, mathematical modelling, data visualisation and interpretation of results. I am a co-author of more than 400 peer-reviewed scientific publications and have spoken in numerous international workshops and conferences.

EMPLOYMENT

Jun. 2017– present
Data Scientist
Enterprise Analytics Division, EPAM Systems Inc., Hungary

Processed large volumes of customer data using advanced analytical solutions. Developed statistical and machine learning models that deliver actionable business insights and support customer goals. Created high-quality data visualisations and BI dashboards. Acted as a consultant, working directly and collaboratively with clients to ensure technical compatibility and user satisfaction.

Sept. 2013– May 2017
Scientific Research Fellow
Wigner Research Centre for Physics, Hungarian Academy of Sciences, Hungary

Performed statistical data analysis for the ALICE experiment at CERN, which recreates conditions that are believed to have existed a fraction of a second after the Big Bang. Used state-of-the-art machine learning to develop predictive classification algorithms for recognising particles based on their decay properties. Conducted the first-ever particle physics data analysis performed entirely in R. Developed pattern recognition algorithms that promise to improve discovery reach in searches for new particles at CERN and beyond.

Founded the ALICE Statistics and Machine Learning Working Group. Co-organiser of the first CERN workshop dedicated to the use of machine learning in particle physics. Engaged with local data science community via public outreach talks and conference presentations.

Apr. 2010– Oct. 2012
Postdoctoral Fellow, Deputy Team Leader
California State University, Fresno, USA (based 100% at CERN, Switzerland)

Systematically investigated the potential benefit of hundreds of different predictor variables for a range of analyses using Monte Carlo simulations written in C++. Several new variables were found that provide significant improvements in sensitivity for a variety of Higgs boson and new particle searches. Developed and productionised core software and algorithms for real-time data analysis.

Feb. 2008– Aug. 2009
Postdoctoral Fellow
Indiana University, USA (based 100% at CERN, Switzerland)

Developed an algorithm in C++ and Python for real-time particle identification in streaming data at an input rate of 1 GB/s. Optimised algorithm parameters and achieved excellent performance. This algorithm underpins a large part of the ATLAS experiment's physics programme by providing the data used for many analyses. It has been used in production for data-taking since 2010 and has currently processed tens of petabytes of data for subsequent analysis by about 3000 physicists.

Mar. 1998– Sept. 2000
Assistant Research Scientist
Centre for Time Metrology, National Physical Laboratory (NPL), UK

Provided technical and administrative support to a range of key activities relating to the maintenance and dissemination of the UK's national time scale.

EDUCATION

2001–2008	**PhD Particle Physics**

Royal Holloway, University of London, UK (including 17 months at CERN, Switzerland)
Thesis title: *Performance and robustness studies of the trigger for the ATLAS experiment*

Played a major role in the development of the core software and algorithms in C++ for a real-time multi-stage cascade classifier that filters and reduces the collision event data rate from 60 TB/s to a manageable 300 MB/s that can be written to permanent storage. Performed detailed time profiling of the core software and devised improvements that made it 8 times faster, thus meeting a critical requirement of the system. Wrote software that was used in the discovery of the Higgs boson.

2000–2001   **MSc Particle Physics**
Royal Holloway, University of London, UK
Thesis title: *Light Higgs $(H \rightarrow b\bar{b})$ at the LHC*

Investigated the search potential of the $H \rightarrow b\bar{b}$ decay channel for a light Higgs boson using the ATLAS detector at CERN. First data-mining analysis of this type to be performed entirely in C++.

1993–1996   **BSc (Hons) Physics**
Royal Holloway, University of London, UK
Final year project: *Primordial nucleosynthesis*

TRANSFERABLE SKILLS

- **Communication:**
  Can work closely with clients as a consultant and communicate effectively with other departments and business stakeholders to discuss complex data-driven findings and technical specifications. Can translate client requirements into highly specified project documentation. Invited speaker at numerous international conferences. Visual storytelling and data visualization best practices. Teamwork in a collaboration of about 3000 people.

- **Problem solving:**
  Capacity to lead independent research, understand and dissect complex problems and find creative solutions.

- **Project management:**
  Accustomed to handling parallel projects with strict deadlines, both on-site and remotely. Knowledge of Agile and Waterfall software development methodologies.

COMPUTING SKILLS

Programming languages:	Software development:	Data mining software:
• C/C++ *(16 years' experience)*	• Jira	• KNIME
• R *(4 years' experience)*	• UML	• Weka
• Python	• Git/GitHub	• RapidMiner
• Octave *(MATLAB software clone)*	• CVS	• Orange
• Bash	• Subversion (SVN)	• H_2O
• FORTRAN	• Emacs	• caret
• Pascal	• RStudio	• mlr
• BASIC	• Valgrind	• ROOT

Documentation:	Operating systems:	Data visualisation:
• LaTeX *(17 years' experience)*	• Unix *(17 years' experience)*	• TIBCO Spotfire
• Markdown	• Linux *(17 years' experience)*	• Tableau
• Doxygen	• Microsoft Windows	• Shiny & ggplot2

Other: object-oriented analysis and design, grid computing, CPU and time profiling, code optimisation, memory debugging, standard office software (Word, Excel). Over 30 years' programming experience in various languages.