Dr. Musie Beyene

Personal details

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Personal statement and summary of skills

I am a highly motivated, PhD educated theoretical physicist (now data scientist) with strong analytical and lateral thinking capabilities. I have over 24 years of teaching and training experience in education and industry, mostly in the United Kingdom but, also in the Middle East and Africa. From pre-university to post-graduate, vocational and corporate training, I have developed and delivered courses in Data Science, Computer Science, Mathematics and Physics.

In my current role as lead Data Science Trainer and Developer I am charged with setting and realizing the strategic direction of company curriculum in Data Science and Machine Learning. This has allowed me to develop a long-standing interest in the mathematical and conceptual foundations of Data Science and Artificial Intelligence and, to acquire skills in the latest technologies. I have developed and delivered courses in Data Analysis in Python (NumPy, pandas, Matplotlib and statsmodels) using Jupyter Lab, **R** programming using RStudio and a Statistics course. In the near future I am planning to develop courses in Machine/Deep Learning (using Scikit-Learn and TensorFlow) and Bayesian Data Analysis using PyMC (and possibly RStan/PyStan).

In the past I have developed and delivered training in Programming (Python, C/C++ and Java), Data-Structures and Algorithms, Software Engineering, Database Design and Development, Advanced Applied Mathematics and Engineering Physics. I have also had the privilege of heading a team that developed an entire curriculum for an undergraduate degree in Computer Science. I have a strong interest in Mathematical modelling and have taught computer based modelling courses that used Matlab and other numerical packages. I have also developed artificial intelligence and stochastic simulations software for research and fun.

Finally, I have management experience both formal and by initiative. As head of department at the Applied Engineering College in Riyadh I was managing 9 professionals from countries including Germany, the UK, Canada and of course Saudi Arabia.

Work experience

Mar 19 - Current **Lead Data Science Developer and Trainer** **StayAhead Training**

I am the lead curriculum developer and trainer charged with designing and implementing StayAheads' Data Science strategy. Our courses currently include programming in R and Python (to advanced levels) and various *Data Analysis* courses using Numpy, Pandas and Matplotlib. In the near future I will be adding courses in *Probability and Statistics*, traditional *Machine Learning* using Scikit-Learn, and *Deep Leaning* in Tensorflow and Pytorch.

Feb 17' - Apr 18' **Head of Maths and Physics** **Applied Eng. College, Riyadh**

I was head of Mathematics and Physics of a degree offering Technical Vocational College of Applied Engineering. My responsibilities included 1. The development and maintenance of curriculum, ensuring relevance to the different specializations and compliance with the European degree awarding body 2. Development of teaching material 3. Structuring course delivery and assessment, and 4. General management duties of a head.

Aug 15' - Sep 16' **IT Instructor** **Aviation College, Riyadh**

I worked as an Information Technology instructor responsible, as part of a team, for ensuring the development and delivery of a pedagogically and professionally relevant information technology course for aviation students. This included content aimed at imparting a functional understanding of the hardware and software of a computer, and, proficiency in the use of packages such as Learning Management Systems (Mediasphere), Aircraft Maintenance Systems (AMS) and Office Packages.

Feb 12' - Mar 15' **Snr. Lecturer Computing & Eng.** **Icon College, London**

I taught modules in Engineering and Computing programmes at the HND level. This is equivalent to 1st and 2nd years of an undergraduate degree. In Engineering I taught Advanced, Analytical and Further Analytical Mathematics and Engineering Science. In Computing, I have taught Computer Systems and Mathematics for software development.

Sep 11' - Feb 12' **Visiting Lecturer in Software Eng.** **City University London**

I taught a course titled Modelling in Software Engineering to final year undergraduate students. It was an introduction to different models of the software development life-cycle. The course put emphasis on a holistic view, from inception to design and delivery of software projects. We used UML as a primary specification and modelling language.

Feb 11' - Apr 12' **Snr. Lecturer in Nanoelectronics** **British Inst. of Tech. and E-Com.**

I delivered a course on nanoelectronics which was one of four modules of a nanotechnology Masters program. It explores the quantum effects of one, two and three dimensional nanostructures and the impact on their electronic properties as well as examining the potential for new electronic technologies.

Feb 04' - Jun 05' **Lecturer in Computer Science** **Eritrean Institute of Technology**

I worked as a lecturer in Computer Science delivering undergraduate courses such as programming in C and Java, Digital Logic and Introduction to Computer Science. I also headed a team that developed the course content of most of the undergraduate program.

Sep 02' - Dec 03' **Lecturer in IT** **South Thames College, London**

I was a member of a group that delivered courses of a modular degree program. I lectured in courses at all undergraduate years in areas including Data Structures and Algorithms, OOD Analysis and Implementation, Java programming etc. I also delivered C++ courses to enhance the skills of professionals in the work place

Sep 02' - Dec 03' **Lecturer of Physics** **Orpington College**

I lectured in A-Level Mathematics and Physics at both first and final years.

Sep 98' - Aug 02' **Lecturer in IT** **Kingsway College**

The courses I delivered include A-level IT, Database and Spreadsheet design.

Education

Oct 05' - Nov 10' **Ph.D. Comp. Molecular Physics** **University of Durham, UK**

Title: ***"Magnetic field control of ultracold atom-molecule collisions"***

The main objective of my PhD research was to determine the prospects of suppressing inelastic cross-sections in atom-molecule collisions by use of magnetic field. The work can be divided broadly in two: 1) Determination of the interaction surface and 2) Quantum scattering calculations. The former requires an understanding of the electronic structure of atoms and molecules, important approximations, representations and many-body solution techniques (in particular Self Consistent Field based methods). Scattering calculations involved an understanding of the under-laying coupled differential equations and coupled channel method for their numeric solution.

The research was entirely computational which gave me the opportunity to develop code in FORTRAN. The calculations were performed on a Linux High Performance Computing facility. Output data was very large in volume and I therefore had to develop programs (and scripts) in Perl and Python to locate and extract the desired data for analysis. Packages such as GNUplot, MATLAB and Gnu Octave were used for plotting, fitting and general analysis.

Sep 94' - Jul 98' **MSci. Mathematics and Physics** **University College London, UK**

This was a four year course which integrated a traditional undergraduate Bachelor of Science with a taught Master's degree. It included traditional beginners and advanced courses in classical and quantum physics, mathematical methods and pure mathematics. At the Masters level were courses in relativistic quantum mechanics, advanced statistical mechanics and general relativity.

The subject of my Master's Degree dissertation was the modelling of phase transitions using Monte Carlo (Stochastic) techniques. Transitions of phase for example from liquid water to ice typically involve the growth of clusters of ice to transform the whole body of water to a solid. However under equilibrium conditions where ice and water can co-exist a cluster of ice can grow or it can recede back to a liquid form. The aim of my project was to determine the critical size of cluster beyond which the new phase is more likely to dominate. This was achieved by simulation using the Ising model. The model used stochastic methods.

Interests and Hobbies

Aside from my interests in technology and science, which transcends professional capacity, I am interested in social and community issues, sports and travelling.

I have volunteered in a homework club for disadvantaged children for over ten years, headed local authority funded summer play schemes and helped organise community festivals in my neighbourhood. I was the chair of ECUK in the year 2011-2012, a registered charity that has been working for over two decades to tackle social and integration challenges of the Eritrean community. While doing my PhD in Durham I helped to organise annual physics demonstrations for the public (especially targeted at the youth) sponsored by the Institute of Physics in Newcastle.

I am a founding member of a professionals network (EriPN) and chair of the engineering and physical sciences subgroup of the network which currently has 11 members. The aim of EriPN is to network professionals with a view to promote personal technical development, encourage business partnerships, exchange of work experience and information, and, inspire the young to choose careers in engineering

and the physical sciences.

Football and swimming are my favourite recreation activities. I have climbed up Ben Nevis, the highest mountain in the British Isles, and travelled on foot and by car visiting geologically active areas in Eritrea and Kenya. I have visited the UAE and lived and travelled in Saudi Arabia. I am fluent in written and spoken English and Tigrinya. I am also fluent in spoken Kiswahili and Amharic with some ability to read and write in both. I would like to learn Arabic.

Publication

Phys. Rev. Lett. 103, 163201 (2009) : Dramatic reductions in inelastic cross sections for ultracold collisions near Feshbach resonances

Reference

Available on request.