

Employment

2017 – present **Postdoctoral research assistant, University of Oxford, UK**
Supervisor: Dr. Sam M. Vinko

Education

2013 – 2018 **PhD in Physics, Wolfson College, University of Oxford, UK**
Thesis title: Quantitative optical probing of plasma accelerators
Supervisors: Prof. Peter A. Norreys and Prof. Philip N. Burrows

2009 – 2013 **BSc in Electrical Engineering (*cum laude*), Institut Teknologi Bandung, Indonesia**
Final project: Computer vision software for automated traffic counting

Research projects

Sep 2017 – present **AI-assisted inverse problem instability analysis**
Supervisor: Dr. Sam Vinko

Using an automatic simulation framework, integrated with **optimisation** and **MCMC** algorithms, we analysed the inverse problem instability of some diagnostics in plasma physics. For a diagnostic, we used **PyTorch** in doing the inverse instability analysis. We found out that some major diagnostics are very insensitive to some important parameters that were thought to be sensitive by the community.

Jul 2017 – present **Investigating non-thermal electrons in solid density plasmas**
Supervisor: Dr. Sam Vinko

My main task in this project is to develop, rewrite, and restructuring software packages from **Fortran** to **C++** to simulate the dynamics of non-thermal electrons in solid density plasmas. One module in the package was successfully improved to have run time more than 1000 times faster in 8 cores using **OpenMP** and **AVX**.

Oct 2013 – Sep 2017 **Plasma wakefield diagnostics with oblique angle optical probing**
Supervisors: Prof. Peter Norreys and Prof. Philip Burrows

My research seeks a new method to diagnose plasma wakefield in a long plasma as used in high energy particle accelerator such as in FACET and AWAKE. I developed a theoretical model and confirmed it with simulations. During the research, I invented a 3D spectrometer that uses **compressed sensing** to retrieve 3D information from 2D data (UK Patent no. GB1712357.1). **Publications no.:** [1][5][6].

Jun 2016 – Sep 2017 **Machine learning algorithms for laser plasma systems optimisation**
Supervisors: Prof. Peter Norreys and Prof. Philip Burrows

During the research, I developed an efficient algorithm to do 1D shape optimisation based on algorithm previously developed by the machine learning community. I also wrote software to optimise parameters in laser plasma systems via simulations in **distributed systems**. Optimisation algorithms included **CMA-ES**, **NES**, and **BO**. The software is used in “AI-assisted inverse problem instability analysis” project. **Publications no.:** [3].

Jan 2016 – Feb 2017 **Quantitative shadowgraphy and proton radiography**
Supervisors: Prof. Peter Norreys and Prof. Philip Burrows

Retrieving the quantitative information from proton radiography was a daunting task because of its non-linearity. I borrowed an algorithm from **optimal transport** and introduced it to plasma physics community. This is the first algorithm to retrieve the quantitative information from proton radiography in the non-linear regime. **Publications no.:** [2][4].

Nov 2012 – Feb 2013 **IC design for noise cancellation using FPGA**
Supervisor: Dr. Trio Adiono

In this research, I and two other colleagues developed an algorithm for noise cancellation for sound and implemented it in hardware using FPGA to get a real time noise cancellation device. **Publications no.:** [7].

Prizes and awards

May 2017 – 2018 **STFC Impact Acceleration Account funding**
Awarded £16,221.86 to develop a new type of spectrometer from the Science and Technology Facility Council (STFC) UK.

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- Oct 2013 – 2017 **Indonesian Endowment Fund for Education doctoral scholarship**
- Dec 2016 **1st winner in International Student Competition in Structural Optimization** [↗](#)
Obtained the best design among 56 participants with 124 design variables to be optimised. The method employed used Covariance Matrix Adaptation – Evolution Strategy (CMA-ES) algorithm and meta-optimisation.
- May 2013 **Best engineering design in Electrical Engineering Day, ITB**
The award was given for two teams that had the best engineering design in the final project in electrical engineering major at Institut Teknologi Bandung.
- Mar 2013 **“Tokyo Electron Device Ltd” Award, LSI Design Contest in Okinawa** [↗](#)
The award was given for a team that has best score in FPGA implementation in the contest. Participants of this Large-Scale-Integration (LSI) contest consisted of undergraduate and graduate students from various universities in Asia and Europe.

Teaching experience and internships

- Sep 2017 – present **Senior computing demonstrator, Computing lab, Department of Physics, University of Oxford, UK**
Responsible for the new demonstrators training and updating the problem scripts apart from other responsibilities as a demonstrator.
- Oct 2014 – Sep 2017 **Junior computing demonstrator, Computing lab, Department of Physics, University of Oxford, UK**
Helping the first and second year undergraduate physics students in their computing lab. The modules contain several problems in physics that require MATLAB to solve.
- Jun 2013 – Aug 2013 **Summer student intern at CERN, Switzerland**
Supervisor: Dr. Suharyo Sumowidagdo
Developing a web-based software to display data from particle detectors. Working in one of the biggest experiment in CERN: CMS.

Skills

Programming languages: Python, C/C++, MATLAB, JavaScript

Parallel/SIMD libraries: SSE, AVX, OpenMP

Deep learning libraries: Tensorflow, Keras, PyTorch

Selected publications

- [1] [M. F. Kasim](#), P. A. Norreys, P. N. Burrows, 3D laser spectrometer, UK Patent No. GB1712357.1.
- [2] [M. F. Kasim](#), L. Ceurvorst, N. Ratan, *et al.*, *Quantitative shadowgraphy and proton radiography for large intensity modulations*, Phys. Rev. E **95**, 023306 (2017) [↗](#) and arXiv:1607.04179 (2016) [↗](#)
- [3] [M. F. Kasim](#) and P. Norreys, *Infinite dimensional optimistic optimisation with applications on physical systems*, BayesOpt workshop at NIPS [↗](#) and arXiv:1611.05845 (2016) [↗](#)
- [4] N. F. Y. Chen, [M. F. Kasim](#), L. Ceurvorst, *et al.*, *Machine learning applied to proton radiography*, Phys. Rev. E **95**, 043305(2017) [↗](#) and arXiv:1608.05582 (2016) [↗](#)
- [5] [M. F. Kasim](#), J. Holloway, L. Ceurvorst, *et al.*, *Quantitative single shot and spatially resolved plasma wakefield diagnostics*, Phys. Rev. STAB **18**, 081302 (2015) [↗](#)
- [6] [M. F. Kasim](#), N. Ratan, L. Ceurvorst, *et al.*, *Simulation of density measurements in plasma wakefields using photon acceleration*, Phys. Rev. STAB **18**, 032801 (2015) [↗](#)
- [7] [M. F. Kasim](#), T. Adiono, M. Fahreza, and M. F. Zakiy, *FPGA implementation of fast serial 64-points FFT/IFFT block without reordering block*, International Conference on Informatics, Electronics & Vision (ICIEV) 2013 [↗](#)