

# Bruno Viola

[bruno.viola@pm.me](mailto:bruno.viola@pm.me) • +44.7594 803465 • [github.com/bruvio](https://github.com/bruvio) • [linkedin.com/in/bruno-viola](https://linkedin.com/in/bruno-viola) • Citizenship: Italian • Visa status: pre-settled status

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## Summary

I am an engineer with more than 10 years of experience in software engineering and numerical modelling applied to nuclear fusion. I have a strong interest in computational physics and electromagnetics, quantitative analysis and algorithm development. I am proficient in manipulating data as I analyse and interpret experimentally observed behaviour and compare them to modeling results, including development of new analysis tools as needed, using Python, IDL, Fortran and Matlab. I perform innovative physics-based research on the development and optimisation of plasma operat-

ing scenarios for future fusion devices, in collaboration with a wide range of organisations, universities and other international teams. I enjoy building, testing and deploying applications on cloud providers (AWS) utilising containers (Docker) or serverless computing. I am open-minded, team oriented and an excellent communicator, always ready to learn something new and interesting. I am seeking a challenging position in an organisation where I can make a significant contribution with a positive and proactive approach.

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## Professional Interests

software engineering, data analysis, data science, machine learning algorithms, numerical simulations, R&D

## Experience

### CCFE - Culham Center for Fusion Energy

CULHAM (OXFORDSHIRE), UK

#### Interferometer code Responsible Officer

May 2017 – present

I am responsible for maintenance and development of the analysis code that analyses density data from the multi-channel far infrared interferometer diagnostic for the Joint European Taurus (JET) tokamak essential diagnostic system, which is used widely for scientific analysis, cross-calibration and machine protection. As computational plasma engineer I also undertake research and development in exploiting plasma exhaust issues by means of numerical codes, computational techniques, promoting, leading and executing experiments.

Tasks and responsibilities:

- performing data validation and executing analysis codes (Python) on experimental measurements from KG1 interferometer system at JET;
- developing accurate computational codes and delivered complex development projects for new and existing research software by using Python, Matlab, and Fortran in conjunction with Docker, Flask/Django, and relational database;
- enhanced end-user experience by designing and executing Graphical User Interfaces (GUI);
- delivering actionable insights/support on software development and research computing to scientists and engineers;
- managing collaborative and personal projects, project files, and documentation by using version control (Github/Gitlab).

### ENEA

FRASCATI (RM), ITALY

#### PhD Researcher

Dec. 2010 – Apr 2017

In this post I provided numerical studies on magnetically confined plasmas for thermonuclear fusion.

- analysis and predictive modelling techniques used for plasma physics research using Python (numpy, scipy, pandas), Fortran and Matlab programming languages;
- interpretative and predictive numerical simulations using multi-fluid and Monte Carlo codes;
- coordinate and supervise PhD students, Post-docs and technician staff;
- actively involved in planning and coordinating experiments;
- responsible officer for the Langmuir probes diagnostic system that provides plasma edge density and temperature measurements for the FTU tokamak device. This includes operating the diagnostic, technical oversight of design and R&D work, preparation of design reviews, procurement arrangements and their follow-up;
- develop and maintain the code (Fortran and Python) and related tools to store, access, process, analyse and visualise data coming out of the Langmuir probes diagnostics.

## C.R.E.A.T.E.

### Scientific Consultant

NAPLES (NA), ITALY

Nov 2007 – Dec 2010

In this post worked on the modelling of plasma and 3D Metallic structures of the JET tokamak.

Tasks and responsibilities:

- iterative and direct methods for the solution of systems of linear and non linear equations;
- generation of numerical grids to be used in Monte Carlo and multi-fluid simulations;
- computational electromagnetic and solution to 3D Finite Element (FEM) problems;
- interpretative and predictive numerical simulations using multi-fluid numerical codes.

## IPPLM - Institute of Plasma Physics and Laser Microfusion

WARSAW, POLAND

### Visiting Scientist

Nov 2013 - Nov 2014

Interpretative and predictive numerical simulations using multi-fluid numerical codes: code development (Fortran) of the multi-fluid code TECXY within the WP-CD EUROfusion task in collaboration with IPPLM.

## IPP - Institute for Plasma Physics

GARCHING BEI MUNICH, GERMANY

### Visiting Scientist

Sep 2010 - June 2011

Studies on the plasma-wall interaction topics:

- computational electromagnetic and solution to 3D Finite Element problems;
- interpretative and predictive plasma edge modelling studies.

## CCFE - Culham Center for Fusion Energy

CULHAM, OXFORDSHIRE, UNITED KINGDOM

### Visiting Scientist

May 2007 - Dec 2013

My activities focused on:

- numerical modelling using the multi-fluid codes EDGE2D/EIRENE;
- studies on the effect of divertor configuration on the neutral distribution;
- support to experimental campaigns;
- electromagnetic plasma and 3D metallic JET structures modelling using finite element codes.

## Education

Università della Basilicata

POTENZA, ITALY

### PhD in Environmental Engineering

Nov 2007 – Feb 2011

*Integrated analysis of physics and engineering of the divertor system for present and future tokamaks.*

This thesis is focused on the study of effects of plasma face components on magnetic measurements and power loads on the divertor of a tokamak.

Università degli studi Mediterranea, Reggio Calabria

REGGIO CALABRIA, ITALY

### Masters of Electronic Engineering

Jan 2005 – Jul 2007

*Thermonuclear axisymmetric plasma control: extension of linearised models to the 3D case and to the current profile control.*

This work is focused on the formalisation and utilisation of linearised FEM model extended to 3D cases.

Università degli studi Mediterranea, Reggio Calabria

REGGIO CALABRIA, ITALY

### Bachelor of Electronic Engineering

Oct 2000 – Jan 2005

Specialisation in Electronics - my final project was about the design and realisation of a weather station based on PIC micro-controller.

## Languages

Italian (*mother tongue*), English (*full professional proficiency*), Spanish (*elementary proficiency*)