Anton Helm

PHYSICISTS · PHD CANDIDATE

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Summery

PhD candidate in Physics with 12 years experience of working in an academic and scientific environment. Proficient in numerical methods for plasma physics and numerical modeling of physical scenarios using particle-in-cell (PIC) codes. Excellent programming and debugging skills for scientific applications with a capability of optimizing and running applications on common large high-performance computing (HPC) systems. Advanced knowledge in using Linux based systems, programming concepts and Python.

Skills

Scientific	Statistics, numerical modeling, applied numerical computing, plasma physics
Programming	Fortran, C/C++, Python, LaTeX, Mathematica, Matlab, CUDA, Hardware optimization, MapReduce, TDD
DevOps	Docker, Vagrant, CI/CD tools
Languages	Russian, German, English, Portuguese

Education

Instituto Superior Técnico   *Lisbon, Portugal*
PHD IN PHYSICS   *since Jan 2015*

   Advanced Program in Plasma Science and Engineering (APPLAuSE)

   expected date of graduation: Jan 2020

University of Technology   *Dresden, Germany*
DIPLOMA DEGREE IN PHYSICS (EQUIV. MASTERS DEGREE)   *Oct 2007 – Jun 2014*

   Thesis title: "Influence of Spatial-Temporal Structure of Laser Pulses on Laser-Plasma Interaction"

Experience

Instituto Superior Técnico (IST)   *Lisbon, Portugal*
PHD CANDIDATE   *Since Jan 2015*

- Implemented a reduced model for laser-wakefield accelerators
- Contributed to EuPRAXIA (conceptual design study report) and AWAKE (an accelerator R&D project based at CERN)
- Contributed to development of PIC code "OSIRIS"
- Consultant and technical support for educational PIC code "ZPIC"
- Setting up and scaling of "OSIRIS" on HPC machines like Marenostrum, Supermuc and JUQUEEN
- Setting up of development cluster based on Intel's Knights Landing processors
- Setting up CUDA development machine with NVIDIA Tesla P100

University of California, Los Angeles (UCLA)   *Los Angeles, California, US*
VISITING GRADUATE RESEARCHER   *May 2017 – May 2018*

- Setting up "OSIRIS" on HPC machines like Cori, BLUE WATERS
- Scaling "OSIRIS" over full Cori Machine (upto 8000 KNL nodes) with full `AVX-512` support
- User-support for incorporation of different numerical solvers into PIC code "OSIRIS"
- Setting up collaborative development environment based on `git` and GitHub for "OSIRIS"
- Moving and setting up new documentation pages for "OSIRIS"
- Collaborative preparation of NSF followup award proposal for "Particle-In-Cell and Kinetic Simulation Center"

Helmholtz-Zentrum Dresden-Rossendorf (HZDR)   *Dresen-Rossendorf, Germany*
GRADUAND   *Mar 2013 – Jul 2014*

- Investigation on spatial and temporal dependance of ion acceleration using tilted laser pulses
- Contributions to open-source PIC code "PIConGPU"
- Parallel post-processing of data using a self-developed Python-based pipeline
  - pipeline utilizes `ipyparallel` with `MPI`-based communicator
  - speedup of post-processing by $\sim 5000\times$

Dresden University of Technology (TUD) *Dresden, Germany*
Teaching Assistant *Nov 2013 – Mar 2014*
- Teaching assistant for the main-curriculum lecture "Programming for Physicist"
- Guiding students through exercises and introducing students to Python

Helmholtz-Zentrum Dresden-Rossendorf (HZDR) *Dresden-Rossendorf, Germany*
Scientific Assistant *Oct 2012 – Mar 2013*
- Simulation of Ion acceleration

Centre Lasers Intenses et Applications (CELIA) *Bordeaux, France*
Scientific Assistant *Dec 2010 – May 2011*
- Studies on shock acceleration for laser-driven applications

Helmholtz-Zentrum Dresden-Rossendorf (HZDR) *Dresden-Rossendorf*
Scientific Assistant *Aug 2010 – Jul 2012*
- Studies on electron transport in micro-structured targets using PIC simulations
- Incorporation of a particle-tracking algorithm for the PIC code "PICLS"

Forschungszentrum Dresden-Rossendorf (FZR) *Dresden-Rossendorf*
Scientific Assistant *Aug 2009 – Oct 2009*
- Parametric studies on different target geometries for laser-driven ion acceleration using PIC-Codes

Forschungszentrum Dresden-Rossendorf (FZR) *Dresden-Rossendorf*
Scientific Assistant *Sep 2008 – Oct 2008, Jul 2007 – Sept 2007*
- Development of LabView Application for optical measurements
- Optimizing time of measurements for measurements of a THz spectrum

Original contributions

Papers

- E Adli et al. "Experimental Observation of Proton Bunch Modulation in a Plasma at Varying Plasma Densities". In: *Physical Review Letters* 122.5 (2019), p. 054802.
- E Gschwendtner et al. "Proton-driven plasma wakefield acceleration in AWAKE". In: *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 377.2151 (2019), pp. 20180418–9.
- P A P Nghiem et al. "EuPRAXIA, a Step Toward a Plasma-Wakefield Based Accelerator With High Beam QualityEuPRAXIA, a Step Toward a Plasma-Wakefield Based Accelerator With High Beam Quality". In: *International Particle Accelerator Conference 2019*. JACoW Publishing, 2019, pp. 2291–2295.
- M Turner et al. "Experimental Observation of Plasma Wakefield Growth Driven by the Seeded Self-Modulation of a Proton Bunch". In: *Physical Review Letters* 122.5 (2019), p. 054801.
- E Adli et al. "Acceleration of electrons in the plasma wakefield of a proton bunch". In: *Nature* 561.7723 (2018), pp. 363–367.
- T Kluge et al. "High proton energies from cone targets: electron acceleration mechanisms". In: *New Journal of Physics* 14.2 (2012), p. 023038.

Talks

- Anton Helm. *3 Things About Python You Have to know*. Lisbon, Portugal: Python Meetup, 2019.
- A Helm et al. *A three-dimensional ponderomotive guiding center solver in OSIRIS*. Split, Croatia: Laser-Plasma Accelerator Workshop 2019, 2019.
- A Helm et al. *Simulation modes in OSIRIS for parametric sutdies in 3d*. Liverpool, United Kingdom: EuPRAXIA 3rd Collaboration Week and Symposium, 2018.
- A Helm and R Fonseca. *Documentation for working with OSIRIS and running OSIRIS*. Los Angeles, California: OSIRIS workshop, 2017.
- A Helm and R Fonseca. *Implementing a ponderomotive guiding center solver: case study*. Los Angeles, California: OSIRIS workshop, 2017.
- A Helm, A Tableman, and R Fonseca. *Accessing OSIRIS and using OSIRIS through GitHub*. Los Angeles, California: OSIRIS workshop, 2017.
- A Helm et al. *Three dimensional modeling using ponderomotive guiding center solver*. Los Angeles, California: OSIRIS workshop, 2017.

POSTERS

- A Helm et al. *Shaping injected electron-beams through magnetic fields in laser-wakefield acceleration*. Milan, Italy: 46th EPS Conference on Plasma Physics, 2019.
- A Helm et al. *3d parametric studies using reduced models for self-modulation instability*. Portland, Oregon: 60th Annual Meeting of the APS Division of Plasma Physics, 2018.
- A Helm et al. *Parametric studies using reduced 3d modeling on plasma scale lengths*. Prague, Czech Republic: 45th EPS Conference on Plasma Physics, 2018.
- A Helm et al. *Laser wakefield acceleration modeling based on ponderomotive guiding center solver using particle-in-cell code OSIRIS*. Belfast, United Kingdom: 44th EPS Conference on Plasma Physics, 2017.
- A Helm et al. *Reduced 3d modeling on injection schemes for laser wakefield acceleration at plasma scale lengths*. Milwaukee, Wisconsin: 59th Annual Meeting of the APS Division of Plasma Physics, 2017.
- A Helm et al. *Implementation of a 3D version of ponderomotive guiding center solver in particle-in-cell code OSIRIS*. San Jose, California: 58th Annual Meeting of the APS Division of Plasma Physics, 2016.
- A Helm et al. *Implementation of ponderomotive guiding centre in three-dimensions in particle-in-cell code*. Leuven, Belgium: 43rd EPS Conference on Plasma Physics, 2016.

SELECTED COLLOBARATIVE WORK

- R Fonseca et al. *OSIRIS 4.0: A state of the art framework for kinetic plasma simulations*. Portland, Oregon: 60th Annual Meeting of the APS Division of Plasma Physics, 2018.
- W Mori et al. *The Particle-in-Cell and Kinetic Simulation Software Center*. Portland, Oregon: 60th Annual Meeting of the APS Division of Plasma Physics, 2018.
- R Fonseca et al. *The ZPIC educational code suite*. Milwaukee, Wisconsin: 59th Annual Meeting of the APS Division of Plasma Physics, 2017.
- T Grismayer et al. *New frontiers in numerical modeling of PW laser plasma interaction*. Prague, Czech Republic.: SPIE Optics + Optoelectronics, 2017.

Honors and Awards

2009	**Honorary member**, Student Association "Glub 11 e.V."	*Dresden, Germany*
2007	**Acknowledgement award**, Award for special scholar accomplishment in physics	*Dresden, Germany*