PERSONAL INFORMATION

Weipeng YAO

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SUMMARY

Over 10 years of international research experience in ultra-short pulse laser-plasma science, magnetized laboratory astrophysics, and magnetized laser-plasma interactions related to inertial confinement fusion. Strong expertise in both advanced computational modeling (PIC + MHD), and also hands-on laboratory experience in large-scale laser facilities. Very good at collaboration, communication, and writing (scientific papers and beamtime proposals).

WORK

2019 – Now
Post-doc Researcher

Laboratoire pour l'Utilisation des Lasers Intenses (LULI), École Polytechnique

Advisor: Julien Fuchs (LULI) & Andrea Ciardi (LERMA)

– use and development of kinetic PIC codes, i.e., **SMILEI** and **EPOCH**, and extended MHD codes **GORGON** and **FLASH**;

– hands-on laboratory experience at large-scale high-power laser facilities worldwide, i.e., **SG-II-U** (CH), **Apollon** (FR) and **Vulcan** (UK).

EDUCATION

2015 – 2019 Ph. D.: Plasma Physics, Peking University, Beijing, China (**TOP 2**)

Thesis Kinetic study of relativistic jet and plasmas interaction in high energy astrophysics

2012 – 2015 Master of Science: Plasma Physics, China Academy of Engineering Physics, Beijing, China

Thesis Particle simulation research on monochromatic proton acceleration via ultra-short ultra-intense laser pulse and multi-component plasma interaction

SKILLS

Experiments

May 2019 Laboratory observation of magnetic reconnection in collisional-collisionless regime at **SG-II-U**

May 2021 First commissioning phase of the short-focal-length area of the **Apollon** laser facility at 1 PW

April 2022 Optimized production of protons driven by the **Apollon** laser facility with double plasma mirror

November 2022 Detailed characterization of the neutron emissions at the **Apollon** laser facility

April 2023 Commissioning of the main beam at the **Apollon** facility at 4 PW level

August 2023 Investigate interpenetrating magnetized collisionless super-critical shocks at **Vulcan**

Code Projects

2022 – 2023 ML algorithm for the unsupervised classification of particles' trajetories, written in Python

2023 – Now Open source, Particle-in-cell code with adaptive mesh refinement **PHARE**, written in C++

2019 – Now Open source, fully kinetic, massively parallel, Particle-in-cell code **SMILEI**, written in C++

2019 – Now PIC module in resistive magneto-hydrodynamic code **GORGON**, written in Fortran

2020 – 2021 Fully integrated particle physics Monte Carlo simulation package **FLUKA**, written in Fortran

2019 – Now The radiation hydrodynamic code **MULTI**, written in C++

2012 – 2019 Open source, fully kinetic, massively parallel, Particle-in-cell code **EPOCH**, written in Fortran

Teaching at Sorbonne University during academic year 2023-2024
Master 1 Numerical Tools in Physics
Master 2 Numerical Methods

Data Analysis
Proficient in Fortran, Python, Matlab, Linux/Unix, Adobe illustrator, Inkscape
Familiar with C++, OpenMP, MPI, VisIt, ParaView
Knowledge of Machine Learning (ML)

REPRESENTATIVE PUBLICATIONS

For an up to date and exhaustive list of articles see my profile on google scholar

Under Review in MRE arXiv:2208.06272 — Optimizing the laser coupling, matter heating, and particle acceleration from solids by using multiplexed ultraintense lasers W. Yao, et al.

Rev. Sci. Instrum. **94**, 083303 (2023) — Absolute calibration up to 20 MeV of an online readout CMOS system suitable to detect high-power lasers accelerated protons, K. Burdonov, ..., W. Yao, et al.

Phys. Rev. Lett. **130**, 265101 (2023) — Dynamics of nanosecond laser pulse propagation and of associated instabilities in a magnetized underdense plasma, W. Yao, et al.

J. of Plasma Phys. **89**, 915890101 (2023) — Investigating particle acceleration dynamics in interpenetrating magnetized collisionless super-critical shocks, W. Yao, et al.

Matter Radiat. at Extremes **7**, 026903 (2022) — Characterization of the stability and dynamics of a laser-produced plasma expanding across strong magnetic field, W. Yao, et al.

Matter Radiat. at Extremes **7**, 014402 (2022) — Detailed characterization of laboratory magnetized super-critical collisionless shock and of the associated proton energization, W. Yao, et al.

Matter Radiat. at Extremes **6**, 064402 (2021) — Characterization and performance of the Apollon short-focal-area facility following its commissioning at 1 PW level, K. Burdonov, ..., W. Yao, et al.

Nature Physics **17**, 1177–1182 (2021) — Laboratory evidence for proton energization by collisionless shock surfing W. Yao, et al.

Astrophysical J. **876**, 2 (2019) — Kinetic Particle-in-cell Simulations of the Transport of Astrophysical Relativistic Jets in Magnetized Intergalactic Medium, W. Yao, et al.

New J. Physics **21**, 033035 (2019) — High-flux high-energy ion beam production from stable collisionless shock acceleration by intense petawatt-picosecond laser pulses, H. He, ..., W. Yao, et al.

Phys. Rev. A **98**, 052119 (2018) — Identifying the quantum radiation reaction by using colliding ultraintense lasers in gases X. B. Li, ..., W. Yao, et al.

New J. Physics — The baryon loading effect on relativistic astrophysical jet transport in the interstellar medium

20, 053060 (2018) W. Yao, et al.

Phys. Plasmas Relay transport of relativistic flows in extreme magnetic fields of stars
24, 082904(2017) W. Yao, et al.

Phys. Plasmas Ultraintense laser absorption and γ-ray synchrotron radiation in near critical density plasmas
24, 043111 (2017) H. X. Chang, ..., W. Yao, et al.

Phys. Rev. E Characterization of magnetic reconnection in the high-energy-density regime
93, 033206(2017) Z. Xu, ..., W. Yao, et al.

Phys. Plasmas Optimization of the combined proton acceleration regime with a target composition scheme
23, 013107 (2016) W. Yao, et al.

Laser Part. Beams Generation of monoenergetic proton beams by a combined scheme with an overdense
32, 583-589 (2014) target and an underdense plasma gas irradiated by ultra-intense laser pulse, W. Yao, et al.

SCIENTIFIC TALKS

11/2023 Réunion Plénière du GDR APPEL 2023, Saclay, France
Invited Oral *Characterization of proton and X-ray generation at the Apollon SFA in 1-2 PW range*
06/2023 6th International Conference on Matter and Radiation at Extremes (ICMRE2023), Zhuhai, China
Invited Oral *Dynamics of nanosecond laser pulse propagation and of associated instabilities in a magnetized underdense plasma*
05/2023 MRE Young Scientist Award 2023, Online
Invited Oral *Laboratory evidence of stochastic ion acceleration in laser-driven magnetized plasma*
12/2022 7th Workshop on Magnetic Fields in Laboratory High Energy Density Plasmas (LaB), Paris, France
Invited Oral *Laboratory stochastic particle acceleration in double-jet collision via magnetic Rayleigh-Taylor instability*
07/2022 48th European Conference on plasma physics (EPS2022), Online
Invited Oral *Laboratory investigation on ion energization by the collision of magnetized collisionless shocks*
05/2022 MRE Young Scientist Award 2022, Online
Invited Oral *Nanosecond laser pulse propagation and laser-plasma instabilities in a magnetized, underdense plasma*
05/2022 13th International Conference on High Energy Density Laboratory Astrophysics, Lisbon, Portugal
Invited Oral *Laboratory evidence for proton energization by magnetized collisionless shocks*
08/2021 9th International Symposium “Modern Problems of Laser Physics”, Novosibirsk/Online, Russia
Invited Oral *Laboratory evidence for proton energization by collisionless shock surfing*
04/2021 International Conference on High Energy Density Sciences 2021, Osaka, Japan
Invited Oral *Laboratory evidence for proton energization by collisionless shock surfing*

HONOURS AND AWARDS

09/2018 National Scholarship
12/2017 Second class of Collaborative Innovation Center of IFSA Scholarship
10/2017 Best Poster Award of the 7th National Conference On HEDP, Xi’an, China
09/2016 Special Scholarship for PhD student, Peking University
05/2016 Third Prize of the 2016 “Zhong Shengbiao Academic Forum”, Peking Univ., Beijing, China
07/2015 Outstanding graduate, Graduate School of CAEP
06/2015 Second class of Academic Scholarship, Graduate School of CAEP

06/2014 Excellent Graduate Student Award, Graduate School of CAEP
2009-2011 Undergraduate Scholarship, Shanxi University

SYNERGIC ACTIVITIES

Invited referee, 2023 Communication Physics
Workshop committee, 2022 7th Workshop on Magnetic Fields in Laboratory High Energy Density Plasmas (LaB), Paris, France
Workshop committee, 2021 Astrophysics with High Power Lasers and Laboratory Plasmas, Sorbonne Université, Paris, France
Invited lecture, 2021 Laser Plasma Physics Course, ELI
Invited referee, 2020 New Astronomy
Conference organizer, 2018 The 4th International Conference on High Energy Density Physics, Ningbo, China
Conference organizer, 2016 The 3rd International Conference on High Energy Density Physics, Shenzhen, China
Invited referee, 2015 Laser and Particle Beams

REFERENCES

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Affiliation LERMA, Sorbonne University, France
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