Zhiyao **YIN**, Ph.D.

Laser Spectroscopy, Plasma Physics, Combustion, Data Science

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Stuttgart, Germany

After finishing college in my hometown Wuhan, I went to graduate school in Columbus, Ohio. What was then intended as a short postdoc sting at the world-renowned combustion diagnostics group at the German Aerospace Center in Stuttgart has lasted till this day. An insatiable learner at heart, my academic career ranges from ship design, through laser/plasma physics, all the way to turbulent flows in stationary/aircraft engines, with a persistent focus on innovative solutions for the energy and transport sectors. My globe-trotting years have made me multicultural, independent, adaptable and always up for new challenges.

Executive Summary

Spectroscopy	10+ years of experience in **laser-based optical diagnostics** involving high-energy, up to kHz repetition rate solid-state and dye lasers as well as compatible spectroscopic/imaging systems
Plasma	5+ years of experience in designing, operating and performing non-intrusive diagnostics in **nonequilibrium nanosecond discharges**
Combustion	5+ years of involvement in developing **low-emission** combustion technologies
Data Analytics	5+ years of experience in image processing and pattern recognition with **machine learning**
Publications	Citations: >900 | h-index: >15 | i10-index: >20 Google Scholar

Professional Experience

Since 2014 — **Research Scientist**

Department of Combustor Systems and Diagnostics | Institute of Combustion Technology | **German Aerospace Center**, Stuttgart, Germany

- Highspeed laser diagnostics for time-resolved 2-D measurements in turbulent reacting flows
- Quantitative spray imaging for particle sizing and velocimetry
- Machine-learning based data analysis, especially for multidimensional image time series (PCA, CNN, Autoencoders)
- Spectroscopy algorithm development with Python
- Project subtask lead: "Superheated and supercritical injection of liquid fuels" under the EU project soprano-h2020.eu (Grant Agreement No. 690724)
- Co-PI: "Understanding the turbulent flame dynamics of jet-stabilized gas turbine combustors" (Helmholtz Grant PD-112)

6 international conferences | 20 publications

2013-2014 — **Postdoc**

Nonequilibrium Thermodynamics Laboratory | Department of Mechanical and Aerospace Engineering | **Ohio State University**, Columbus, OH, USA

- Quantitative laser spectroscopies for a multiphase plasma flow reactor

1 international conferences | 6 publications

2008-2013 — **Research Associate**

Nonequilibrium Thermodynamics Laboratory | Department of Mechanical and Aerospace Engineering | **Ohio State University**, Columbus, OH, USA

- Quantitative laser spectroscopies in nonequilibrium low-temperature plasmas
- Kinetic modeling and applications of plasma-assisted combustion
- Project subtask lead: kinetic studies in a 0-D plasma reactor under "Fundamental aspect of plasma-assisted combustion" (AFOSR)

9 international conferences | 18 publications

Education

2013 — **Ph.D.** in **Mechanical Engineering**
Ohio State University, Columbus, OH, USA
Dissertation: "Fuel oxidation and ignition by nanosecond pulse discharge at elevated temperatures"

2008 **B.S.** in **Naval Architecture**
Huazhong University of Science and Technology, Wuhan, China
Thesis: "2-D simulation of supercavitation on a NACA0012 airfoil"

Awards & Certificates

2020 TensorFlow Developer Certificate (ID:25378502)
2020 DeepLearning.AI TensorFlow Developer Specialization (Coursera)
2019 telc Deutsch C1 (Prädikat: Gut)
2017 Best Paper, 2017 ASME Turbo Expo DOI: 10.1115/GT2017-65003
2014 Helmholtz Postdoc (Grant PD-112 | 3 years with 150 k€ funding)
2014 Distinguished Paper, 35th International Symposium on Combustion DOI: 10.1016/j.proci.2014.05.073
2012 Distinguished Paper, 34th International Symposium on Combustion DOI: 10.1016/j.proci.2012.07.015
2008 Distinguished University Fellowship (Ohio State University | 2-year full graduate school fellowship)

Languages

Chinese Native speaker (Mandarin)
English Fluent (C2+)
German Fluent (C1+)
French Intermediate (A2-B1)
Japanese Beginner (A1-A2)

Skills

Hardwares (kHz-Rate) Solid-State and Dye Lasers, (kHz-Rate, intensified) CCD/CMOS Camera Systems, Nanosecond Pulse Discharges
Diagnostics Mie Scattering, Particle Image Velocimetry (PIV), Laser Absorption Tomography, Coherent Anti-Stokes Raman Spectroscopy (CARS), (Planar) Laser-Induced Fluorescence (LIF), (Microscopic) Laser Shadowgraphy, Phosphors Thermometry, Emission Spectroscopy
Programming Python, Matlab, HTML/CSS, C++
Softwares Git, LaTex, LabView, Catia, Origin, DaVis, VSCode, Inkscape
ML Tensorflow, Scikit-Learn, Pandas
Web Dev Dash-Plotly, Django, Jekyll, Sphinx, Bootstrap

Open Source Projects

CARSPY github.com/chuckedfromspace/carspy carspy.readthedocs.io carspy.herokuapp.com
A python module for synthesizing and fitting experimental coherent anti-Stokes Raman (CARS) spectra
CARS | Spectroscopy | Numpy | Scipy | Cantera | Sphinx | Dash-Plotly | Bootstrap

MRPOD github.com/chuckedfromspace/mrpod mrpod.readthedocs.io
A python module for Multiresolution Proper Orthogonal Decomposition (MRPOD) of multidimensional image time series
Discrete Wavelet Transform | PCA | Numpy | Scipy | Sphinx

PYLAT github.com/chuckedfromspace/pylat
A python module for 2-D tomographic reconstruction of two-color laser absorption with irregularly arranged diode lasers
Tomography | Spectroscopy | Machine Learning | Numpy | Scipy

PYTHONIZE github.com/chuckedfromspace/pythonize chuckedfrom.space/pythonize
A knowledge base for data crunching and visualization in Python
Spectroscopy | Machine Learning | Jupyter Book | Matplotlib | Plotly | Pandas | Numpy | Scipy | Scikit-Learn | TensorFlow | Sphinx