Curriculum Vitae



HOSSEIN AKOU

Associate Professor, Physics
Babol Noshirvani University of Technology
Department of Basic Sciences, Physics
Babol, Iran
Date of Birth: 1 July 1982
+989113218575 | h.akou@nit.ac.ir & Hossein.akou@gmail.com
Google Scholar: https://scholar.google.com/citations?user=2Crv9GIAAAAJ&hl=en&oi=ao

PERSONAL INFO

Date of birth: 01-07-1982
Born: Mahmoodabad, Iran
Marital Status: Married, One daughter
Tel/Cell**:** +98 (11) 32310834 / +98-9113218575
Fax: +98 (11) 32334203

ACADEMIC QUALIFICATION

PhD Degree in Atomic and Molecular Physics **2008-2012**
Mazandaran university, Babolsar, Iran
Doctoral Thesis: "Investigation of charged particle acceleration in chirped femtosecond laser pulse"

PhD Sabbatical leave
University of Milano Bicocca, Milan, Italy

MSc. Degree in Atomic and Molecular Physics **2005-2008**
Mazandaran university, Babolsar, Iran
Thesis title**:** "Polarization effect on electron laser acceleration in vacuum"

BSc. Degree in Solid State Physics **2001-2005**
Mazandaran university, Babolsar, Iran

RESEARCH INTEREST

- **High Power Laser Plasma Interactions**
- **Plasma Science**
- **Laser matter interactions**
- **Laser Wakefield Accelerators**

- **Theoretical/analytical modelling for laser electron acceleration in vacuum and plasmas**
- **Simulations and programming Laser Plasma Interaction**
- **Nonlinear Optics**

TEACHING EXPERIENCES

- **Classical Electrodynamics** (M.Sc.)
- **Advanced Plasma Physics** (M.Sc.)
- **Advanced Optics** (M.Sc.)
- **Advanced Quantum Mechanics** (M.Sc.)
- **Advanced Laser Physics** (M.Sc.)
- **Computational Physics** (M.Sc.)
- **Free electron laser** (M.Sc.)
- **Optics** (B.Sc.),
- **Applied Optics** (B.Sc.)
- **Optics Lab** (B.Sc.)
- **Modern Physics** (B.Sc.)
- **Fundamentals of Physics, Electricity & Magnetism** (B.Sc.)
- **Fundamentals of Physics, Mechanics** (B.Sc.)

REVIEWR OF ISI JOURNALS

- **Physics of Plasmas**
- **Physics Letters A**
- **Physica Scripta**
- **Applied Physics B**
- **Physics of Fluids**
- **Optical and Quantum Electronics**
- **Plasma Physics and Controlled Fusion**
- **Nuclear Instruments and Methods in Physics Research A**
- **IEEE Transactions on Plasma Science**
- **Contributions to Plasma Physics**
- **Journal of Optics**
- **Optics Letters**
- **Optik**
- **Modern Physics Letters B**
- **Optical and Quantum Electronics**
- **IEEE Transactions on Plasma Physics**
- **Indian Journal of Physics**
- **Brazilian Journal of Physics**

STUDENTS SUPERVISED

I have supervised about 30 Master thesis students in atomic and molecular physics at Babol Noshirvani University of Technology, Babol, Iran.

RESEARCH PAPERS AND CONFERENCE PROCEEDINGS

JOURNAL PUBLICATION

1) **Hossein Akou**, "*Polarization- and chirp-controlled Hermite-Cosh-Gaussian beam for efficient laser electron acceleration*", Optical and Quantum Electronics 58, 2 (2026).
2) **Hossein Akou**, "*Efficient confinement and acceleration of relativistic electron bunch in interaction with higher modes of Hermite–Gaussian laser beam*", Physics of Plasmas 32 (1) (2025).
3) M Hamidi, A.S Firouzjaei, **Hossein Akou**, "*Enhancing the Quality of Accelerated Electron Bunch Through the Circular Laguerre–Gauss Laser Pulses*", Brazilian Journal of Physics 55 (3), 1-9 (2025).
4) A.S Firouzjaei, **Hossein Akou**, "*Analysis of frequency chirping on the electron bunch acceleration during Laguerre–Gauss laser interaction*", Journal of the Optical Society of America B 40 (8), 1953-1959 (2023).
5) **Hossein Akou**, "*Quantitative analysis of the wave polarization effect on electron capture in a laser acceleration channel*", Journal of the Optical Society of America B 40 (7), 1807-1814 (2023).
6) M Roshanbin, H Alinejad, **Hossein Akou**, "*Nonlinear brain dynamics in neural field model and harmonic generation responses to the external stimuli*", Iranian Journal of Physics Research 23 (1), 115-124 (2023).
7) **Hossein Akou**, "*Excitation of upper-hybrid plasma wake wave by a low-frequency extraordinary electromagnetic wave*", Contributions to Plasma Physics, **61**, 1 (2021).
8) Davod Nobahar, **Hossein Akou**, "*Distortion of a twisted beam passing through a plasma layer*", Applied Optics, **59**, 6497 (2020).
9) Yeganeh Heydarzadeh, **Hossein Akou**, "*Effect of Laser Polarization Mode on Wake Wave Excitation in Magnetized Plasma*", IEEE Transactions on Plasma Science, **48**, 3088 (2020).
10) **Hossein Akou**, Ali Shekari Firouzjaei, "*Direct electron bunch acceleration by Laguerre-Gauss laser pulse*", Physics of Plasmas, **27**, 093102 (2020).
11) Yeganeh Heydarzadeh, **Hossein Akou**, "*Laser wakefield generation by R, L, X and O modes in magnetized plasma*" Iranian Journal of Physics Research **19**, 835 (2020).
12) Seyed hesameddin Hashemian, **Hossein Akou**, "*Hollow high-quality electron beam generation by cyclotron autoresonance in laser-induced acceleration*", Optik, **202**, 163708 (2020).

13) **Hossein Akou**, "*Investigation of induced chirp type and its effect on wake field amplitude in propagation of laser pulse through a plasma channel*", Iranian Journal of Physics Research 16 (2), 231-238 (2019).
14) **Hossein Akou**, "*Effect of ultrafast laser pulse shape on the electron-plane wave interaction in vacuum*", Journal of the Optical Society of America B-Optical Physics, **36**, 603 (2019).
15) **Hossein Akou**, "*A precise analysis of the electron capture process through chirping wave frequency from a phase viewpoint*", Physics of Plasmas, **25**, 063105 (2018).
16) Mehdi Asri, **Hossein Akou**, "*Influence of sense rotation of circularly polarized laser pulse on the wake-field acceleration in magnetized plasma*", Optik, **143**, 149 (2017).
17) **Hossein Akou**, "*Effect of various chirped frequency functions on Gaussian laser beam characteristics*", Optik, **131**, 453 (2017).
18) **Hossein Akou**, "*Investigation of induced chirp type and its effect on wake field amplitude in propagation of laser pulse through a plasma channel*" Iranian Journal of Physics Research **16**, 231 (2016)
19) **Hossein Akou** and Mehdi Asri, "*Dependence of plasma wake wave amplitude on the shape of Gaussian chirped laser pulse propagating in a plasma channel*" Physics Letters A **380**, 1729 (2016).
20) **Hossein Akou** and Mona Hamedi, "*High energy micro electron beam generation using chirped laser pulse in the presence of an axial magnetic field*", Physics of Plasmas, **22**, 103120 (2015).
21) Farshad. Sohbatzadeh and **Hossein Akou**, "*Group velocity dispersion and relativistic effects on the wakefield induced by chirped laser pulse in parabolic plasma channel*", Physics of Plasmas, **20**, 043101 (2013).
22) Farshad. Sohbatzadeh and **Hossein Akou**, "*Polarization effect of a chirped Gaussian laser pulse on the electron bunch acceleration*", Journal of Plasma Physics, **77**, 39, (2011).
23) Farshad. Sohbatzadeh, Saeed Mirzanejhad, **Hossein Akou**, and S. Ashouri, "*Chirped Gaussian laser beam parameters in paraxial approximation*", Physics of Plasmas, **17**, 083108 (2010).
24) Farshad. Sohbatzadeh, S. Mirzanejhad, **Hossein Akou**, "*Synchronization scheme in electron vacuum acceleration by a chirped Gaussian laser pulse*", Phys. Plasmas, **16**, 023106 (2009).

CONFERENCE PAPERS

1) M. Khadem, **H. Akou**, "*confinement and acceleration of electron beam in interaction with higher modes of Hermote-Gaussian laser beam*" 30th Iranian Conference on Optics and Photonics, Iran University of Science and Technology, Tehran, Iran (2022).

2) Y. Heydarzadeh, **H. Akou**, "*The comparison of wakefield amplitude in various modes of lasers in magnetized uniform plasma*"10th Conference on Engineering and Physics of Plasma, Islamic Azad University Science and Research Branch, Tehran, Iran (2023).
3) N. Yousefnejhad, **H. Akou**, "*Applying the Jones method to investigate the wave polarization effect on the electron capture in laser acceleration channel*" 10th Conference on Engineering and Physics of Plasma, Islamic Azad University Science and Research Branch, Tehran, Iran (2023).
4) F. Salehi, **H. Akou**, "*Study of ion beam laser acceleration suitable for medical applications*" 9th Conference on Engineering and Physics of Plasma, Gonbad Kavous University, Gonbad, Iran (2022).
5) E. Mofidi Nasab, **H. Akou**, "*Investigation of laser beat waves effect on vacuum electron acceleration*" 9th Conference on Engineering and Physics of Plasma, Gonbad Kavous University, Gonbad, Iran (2022).
6) M. Hamidi, AS Firouzjaei, **H. Akou**, "*Investigation of the mechanism of single electron acceleration by Laguerre Gauss laser beam in vacuum*" 9th Conference on Engineering and Physics of Plasma, Gonbad Kavous University, Gonbad, Iran (2022).
7) Y. Heydarzadeh, **H. Akou**, "*Plasma Wake wave excitation by a low-frequency Extra-ordinary EM wave*" 28th Iranian Conference on Optics and Photonics, Shahid Chamran University, Ahvaz, Iran (2022).
8) E. Mofidi Nasab, **H. Akou**, "*Investigation of TEM(1,0)+(0,1) mode on the quality of electron beam in its vacuum laser acceleration*" 28th Iranian Conference on Optics and Photonics, Shahid Chamran University, Ahvaz, Iran (2022).

A. Ghorbani, **H. Akou** "*Calculation of Gaussian laser beam characteristics with general chirped frequency function*" 27th Iranian Conference on Optics and Photonics, University of Sistan & Balouchestan, Zahedan, Iran (2021).
B. Shekari-Firouzjaei, **H. Akou**, "*Electron bunch acceleration from rest in vacuum by Laguerre-Gauss Laser pulse*" 7th Conference on Engineering and Physics of Plasma, Shahroud University of Technology, Shahroud, Iran (2019)

9) Y. Heydarzadeh, Z. Gholami rostam, H. Moayyedi, **H.Akou**, "*Laser wakefield generation by extra-ordinary wave (x-wave) with various frequencies in magnetized plasma*" 25th Iranian Conference on Optics and Photonics, Shiraz University, Shiraz, Iran (2019).
10) Y. Heydarzadeh, **H. Akou** "*Investigation of L and R waves propagation in under-dense plasma and wakefield excitation*" Conference in Plasma Engineering and Physics, Imam Khomeini International University, Gazvin, Iran (2018).
11) **H. Akou** and M. Fouladi, "*Optimizing of the asymmetry of a laser pulse in the electron energy gain*" 4th Conference on lasers and their applications, Sharif University of Technology, Tehran, Iran (2016).
12) **H. Akou** and M. Fouladi, "*The effect of laser pulse quadratically chirp on vacuum laser electron acceleration*", 22nd Iranian Conference on Optics and Photonics, Yazd University, Yazd, Iran (2016).

13) **H. Akou** and S. Rashidi, "*Role of the chirp type of laser pulse in producing high energy electron in a homogeneous plasma*", International Conference on Plasma Science and application (ICPSA), Isfahan, Iran (2015).
14) **H. Akou**, M. Hamedi, *Effect of external magnetic field on high-energy electron beam quality in laser acceleration*, Annual Physics Conference of Iran, University of Sistan & Balouchestan, Zahedan Iran (2014).
15) **H. Akou**, *High amplitude wakefield generation using chirped laser pulse propagating in a plasma channel*, 2nd International Conference on New Frontiers in Physics (ICNFP), Istanbul, Turkey (2014).
16) **H. Akou**, *The effect of laser pulse shape on magnitude of laser wakefield in a plasma channel*, The 2nd conference in plasma engineering and physics, Mazandaran University, Babolsar, Iran (2014).
17) **H. Akou**, *Investigation of relativistic effect on laser pulse time duration and induced chirp in matched propagation through a parabolic plasma channel*, 3th Iranian Conference on Optics and Laser Engineering, Malek Ashtar University of Technology, Isfahan, Iran (2013).
18) **H. Akou**, *Investigation of type of femtosecond laser pulse induced chirp due to its propagation into plasma channel and its effect on wakefield amplitude*, The first conference in plasma engineering and physics, Shahid Beheshti University, Tehran, Iran (2013).
19) **H. Akou**, F. Sohbatzadeh, *Investigation of GVD and relativistic effects on the wakefield induced by chirped laser pulse in parabolic plasma channel*, 19th Iranian Conference on Optics and Photonics, University of Sistan & Balouchestan, Iran (2013).
20) F. Sohbatzadeh, **H. Akou**, S. Mirzanejhad and M. Ghalandari, *Time and spatial evolution of produced plasma by the propagating femtosecond laser pulse in air*, 2nd National Conference on Optics & Laser Engineeing, Malek Ashtar University of Technology, Isfahan, Iran (2011).
21) F. Sohbatzadeh, S. Mirzanejhad and **H. Akou**, *Simulation of Femtosecond Fast Electron Pulse Generation using Ultraintense Laser Pulse in Vacuum*, 1st National Conference on Optics & Laser Engineeing, Malek Ashtar University of Technology, Isfahan, Iran (2009).
22) F. Sohbatzadeh, S. Mirzanejhad and **H. Akou**, *Simulation of Electron Velocity and Femto Second Laser`s Phase Velocity Synchronization with Chirped Pulse in Vacuum*, 15th Iranian Conference on Optics and Photonics, University of Isfahan, Iran (2009).
23) F. Sohbatzadeh, S. Mirzanejhad and **H. Akou**, *Simulation of GeV electron bunch properties by a femtosecond laser pulse*, 14th Iranian Conference on Optics and Photonics, Rafsanjan Vali-e-Asr University, Iran (2008).
24) F. Sohbatzadeh, S. Mirzanejhad and **H. Akou**, *The effect of chirped laser pulse polarization on the electron bunch acceleration*, Annual Physics Conference of Iran, Yasouj University, Iran (2007).

Computer Skills

Languages: Fortran, MATLAB, Python

Simulation Tools: Monte Carlo, Molecular Dynamics