CurriculumVitae

ELNAZ IRANI

I. PERSONAL INFORMATION:

Full Name: **ELNAZ IRANI**

Email address: e.irani@ modares.ac.ir ; irani.elnaz@yahoo.com,
Date of Birth: 19 Sep. 1984
Sex: Female
Nationality: Iranian
Phone number:82884436
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II. CURRENT POSITION

Associate Professor

Address: Department of Physics, Tarbiat Modares University, Tehran, Iran;

Research area: Theoretical and experimental atomic and molecular physics; Laser technology and quantum-based description of laser-matter interaction; Ultrafast spectroscopy and ultrafast molecular dynamics by time dependent density functional theory (TDDFT); Disorder Media and applications,

III. EDUCATION

***Ph.D.** in Atomic-Molecular Physics**;** Sharif University of technology, Tehran-Iran, **2010-2014**.
Total GPA without final thesis: **19.48/20**, (First in class).
Final thesis grade: **Excellent degree**
PHD thesis title: Molecular Dynamics study in the interaction of intense femtosecond laser pulse with methane molecule;
Supervisors: Dr. R. Sadighi-Bonabi(SUT), Dr. A. Anvari (SUT), Advisor: Dr. R. Asgari (IPM)

***M.Sc** in Atomic-Molecular Physics, Sharif University of technology, Tehran, Iran, **2007- 2009.**
Total GPA: **18.34/20**
Final thesis: **20/20**
M.Sc thesis title: Surveying the process of photo-dissociation of methane using the femtosecond lasers.

Supervisor: Dr. R. Sadighi-Bonabi (SUT)

***B.S**. in Atomic-Molecular Physics , Iran, **2004- 2007;**
Total GPA: **16.39/20**

***High school diploma**- Hajar school, Iran, **2003**. Total GPA: **19/20.**

IV. Professional Experience

Associate Professor, Department of Physics, Tarbiat Modares University, Tehran, Iran (June 2023-present)

Assistant Professor, Department of Physics, Tarbiat Modares University, Tehran, Iran (Jan.2017-June 2023)

Postdoc researcher, Sharif University of Technology (SUT), Tehran Iran, (Sep.2014-Jan2017)

V. AWARDS AND HONORS

1st place, among Ph.D. candidates in Physics department, Sharif University of Technology (SUT). (2014)

Received the best Paper award and the best speaker of laser conference in Trabiat-Modares university (2014)

Received the Dr. Shahid Kazemi Ashtiani award from Iran's National Elites Foundation (2016)

Received the Dr. Shahid Chamran award from Iran's National Elites Foundation (2016)

Received the research grant from the National Science Foundation (2016)

Received the research International Young Assistant professors grant from National Elites Foundation (2017)

Received the research grant from the National Science Foundation (2018)

Received the international grant for Iran-Austria joint program (IAJP) from Ministry of Science, Research and Technology (2018)

Distinguished researcher of Tarbiat Modares University in the field of applied projects and supervisors of demand-oriented theses (2022)

Distinguished Researcher of Tarbiat Modares University in the field of co-publishing with industry and supervisor of the top thesis of Tarbiat Modares University Faculties of Basic Sciences (2023)

VI. RESEARCH INTEREST:

Laser and optics, Laser-matter interaction, Femtosecond and attosecond phenomena, Molecular dynamics and molecular spectroscopy, Laser Ablation, Disorder media and random lasers, Photonics, Biophysics in general

[1] Interaction of laser with molecules
[2] Laser technology and applications
[3] Quantum mechanical/molecular mechanical (QM/MM) simulations
[4] Photo-dissociation and Photo-ionization of molecules
[5] Computational Quantum Chemistry
[6] Time Dependent Density Functional Theory, Linear and Non-Linear response subject
[7] Ultra-fast laser spectroscopy
[8] Disorder media and random lasers

VII. ISI Papers:

[1] R. Sadighi-Bonabi , **E. Irani**, B. Safaie, Kh. Imani, M. Silatani, S. Zare, "Possibility of ultra-intense laser transmutation of ^{93}Zr (c, n) ^{92}Zr a long-lived nuclear waste into a stable isotope", **Energy Conversion and Management**, 51, 636–639, **(2010).**

[2] **E. Irani**, S. Zare, H.A. Navid, Z. Dehghani, and R. Sadighi-Bonabi, "The effect of intense short pulse laser shapes on generating of the optimum wakefield and dissociation of methane molecule", **Laser and Particle Beams**, 30, 357, **(2012)**.

[3] **E. Irani**, S. K. Sadighi, S. Zare, R. Sadighi-Bonabi, "Laser-induced photo transmutation of 126Sn – A hazardous nuclear waste product-into short-lived nuclear medicine of 125Sn", **Energy Conversion and Management**, 64, 466, **(2012).**

[4] S. Zare , **E. Irani**, H. A. Navid, Z. Dehghani, A. Anvari, R. Sadighi-Bonabi, "Dissociation of C-H Molecular Bond of Methane by Pulse Shaped Ultra-Intense Laser Field", **Chem. Phys. Lett.** 560,60-65**, (2013).**

[5] **E. Irani**, H. Omidvar, R. Sadighi-Bonabi, "Gamma Rays Transmutation of Palladium by Bremsstrahlung and Laser Inverse Compton Scattering", **Energy Conversion and Management,** 77, 558-563, **(2013).**

[6] H.A. Navid, **E. Irani**, R. Sadighi-Bonabi, "The effect of ultraviolet lasers on conversion of methane into higher hydrocarbons", **Laser and Particle Beams**, 31,481, **(2013).**

[7] **E. Irani**, R. Sadighi- Bonabi, A. Anvari, "Investigation of intense femtosecond laser ionization and dissociation of methane with time -dependent density functional approach", **Chem. Phys. Lett.** 604, 60, **(2014).**

[8] A.Mostafai, **E.Irani**, R.Sadighi-Bonabi, "Alignment dependence of ionization probability of Cl2, Br2 and S2 molecules by intense femto-second laser pulse", **Journal of Molecular Structure**, 1072, 122**, (2014).**

[9] **E. Irani**, R. Sadighi- Bonabi, A. Anvari, "Dissociative ionization of methane in an elliptical pulse shaped laser field", **Journal of Molecular Structure**,1079,454, **(2014).**

[10] S.Rasti, **E. Irani**, R. Sadighi-Bonabi, "Optimal control of dissociation of nitrogen molecule with ultra-short laser pulse shaping", **Journal of Molecular Structure**, 1083,121, **(2015).**

[11] S.Rasti, **E. Irani**, R. Sadighi-Bonabi, **"**Efficient photo-dissociation of CH_4 and H_2CO molecules with optimized ultra-short laser pulses" , **AIP Advances**, 5,117105, **(2015).**

[12] H. Navid, **E. Irani**, R. Sadighi-Bonabi, "Possibility of methane conversion into heavier hydrocarbons using nanosecond lasers", **Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy**, 156,18-22, **(2016).**

[13] A.M. Koushki, M. Mohsen-Nia, R. Sadighi-Bonabi, **E. Irani**, "Ionization dynamics of orbitals and high-harmonic generation of N_2 and CO molecules at the various XC potentials by TD-DFT ", **Computational and Theoretical Chemistry**, 1095,104-111, **(2016).**

[14] L. Hedayatifar, **E.Irani**, M. Mazarei, S. Rasti, Y. Taghipour Azar, A. Rezakhani, A. Mashaghi, F. Shayeganfar, M. Anvari, T. Heydari, A. Rahimitabar, N.Nafari, M.A. Vesaghi, R. Asgari and M.Reza Rahimitabar, "Optical absorption and electronic spectra of chlorophylls: TDDFT studies", **RSC Advances**, 6,109778, **(2016).**

[15] H. Ghaforyan, **E. Irani** , R. Sadighi-Bonabi , "The effect of chirped laser pulses on the Argon cluster interaction", **Advances in high energy physics**, 2016, **(2016).**

[16] **E. Irani**, A. Anvari, R. Sadighi-Bonabi, "Selective photo-dissociative ionization of methane molecule with TDDFT study", **Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy**, 171, 325-329**, (2017).**

[17**] E Irani**, A Anvari, R Sadighi-Bonabi, M Monfared, "Multielectron dissociative ionization of methane and formaldehyde molecules with optimally tailored intense femtosecond laser pulses", Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy, 185, 298-303, **(2017).**

[18] A. M. Koushki, R. Sadighi-Bonabi, M. Mohsen-Nia, **E.Irani**, "The control of electron quantum trajectories on the high-order harmonic generation of CO and N_2 molecules in the presence of a low frequency field", The Journal of Chemical Physics, 148, **(2018).**

[19] A.M. Koushki, R. Sadighi-Bonabi, M. Mohsen-Nia, **E Irani**, "High-order harmonic generation of CO and N_2 molecules under linearly-and bi circularly-polarized laser pulses by TD-DFT", Laser Physics 28 (7), 075404**, (2018)**.

[20] M. Pashazadeh, **E. Irani,** M.M. Golzan, R. Sadighi-Bonabi, "Controlling the properties of TiO_2 nanoparticles generated by nanosecond laser ablation in liquid solution", Laser Physics 28 (8), 085601, **(2018).**

[21] M. Monfared, **E. Irani**, R. Sadighi-Bonabi; "Controlling the multi-electron dynamics in the high harmonic spectrum from N_2O molecule using TDDFT", The Journal of Chemical Physics 148 (23), 234303, **(2018).**

[22] M. Mofared, **E. Irani**, R. Sadighi-Bonabi, "Enhancing high harmonic generation by the global optimization of a two-color chirped laser field", **Physical Chemistry Chemical Physics** 21(18), 9302-9309, **(2019)**.

[23] **E.Irani,** M. Monfared, "Efficient high harmonic generation of bromine molecule by controlling the carrier-envelope phase and polarization of driving laser pulse", **Chemical Physics Letter** 719, 27-33, **(2019).**

[24] M. Amoli-Diva, **E. Irani**, K. Pourghazi, "Photocatalytic filtration reactors equipped with bi-plasmonic nanocomposite/poly acrylic acid-modified polyamide membranes for industrial wastewater treatment", **Separation and Purification Technology**, 236, 116257 **(2020).**

[25] **E.Irani**, M. Amoli-Diva, "Hybrid adsorption–photocatalysis properties of quaternary magneto-plasmonic ZnO/MWCNTs nanocomposite for synergistic effect of photocatalytic removal and membrane filtration in wastewater treatment", **Journal of Photochemistry and Photobiology**, **(2020).**

[26] M.S Hosseini, E. Yazdani, **E. Irani**, B. Sajad, F.Mehradnia, S. Bazire, A. Bayat, "Mode-controlled random laser assisted by stimulated Raman scattering", **Optics Communications** 500, 127338, **(2021)**

[27] M.R. Khodaverdi, **E.Irani**, "Investigation of ablation efficiency during pulsed laser ablation of zinc metal target in distilled water environment", **OSA Continuum**, 4, **(2021)**

[28] **E.Irani**, E.Yazdani, A. Bayat, "Enhancement and tuning of optical properties of CdTe/CdS core/shell quantum dots by tuning shell thickness", **Optik**, 249, 168198, **(2022)**

[29] A. Sadeghifaraz, **E.Irani**, M. Monfared, "Efficient attosecond pulse generation from WS_2 semiconductor by tailoring the driving laser pulse", **Optics Communications**, **(2022)**

[30] M.Monfared, **E.Irani,** C Lemell, J Burgdörfer, "Influence of coherent vibrational excitation on the high-order harmonic generation of diatomic molecules", **Phys. Rev.A**, 106 (5), 053108 **(2022)**

[31] A. Madhani, **E.Irani,** M. Monfared, "Generation of the isolated highly elliptically polarized attosecond pulse using the polarization gating technique: TDDFT approach", **Optics Express**, 31(11), 18430-18443 **(2023)**

[32] A.Sadeghifaraz, **E.Irani**, M.Monfared, "Exploring key factors influencing high harmonic generation in monolayer WS2: insights from semi-conductor Bloch equations based on Haldane's model", **The European Physical Journal Plus** 138 (11), 1-12 **(2023)**

[33] A Sadeghifaraz, R Faghih-Latif, **E Irani**, M Monfared, "Investigating high harmonic yield from different alignments of WSe2 semiconductor", **Optics Communications** 552, 130054 **(2024).**

Book

[1] E. Irani, R. Sadighi-Bonabi, A. Anvari, " Interaction of intense femtosecond lasers with molecules", **LAMBERT academic publishing (2017).**

International Conference:

[1] R. Sadighi-Bonabi, Z. Dehghani and **E. Irani**, "Optimization of two tailored rectangular femtosecond laser pulses in methane dissociation", Publish in SPIE Belgium Journal, **(2009).**

[2] **E. Irani**, Z.Dehghani, R.Sadighi-Bonabi, Study of the Dissociation Probability of Methane in Intense Laser Fields", Publish in SPIE Belgium Conference , **(2009).**

[3] **E. Irani**, Z.Dehghani, R.Sadighi-Bonabi ," Photo Dissociation of Methane in the Strong Femtosecond Laser Field", Publish in ECLIM Conference, **(2010)**.

[4] R. Sadighi-Bonabi, Z. Dehghani and **E. Irani**, "The effect of the two tailored femtosecond laser pulses in the enhancement of methane dissociation" Publish in ECLIM conference, **(2010).**

[5] K. Sadighi, M. Monfared, **E.Irani**, R. Sadighi-Bonabi, "Generation of attosecond pulse in interaction of chirped femtosecond laser pulse with nitrous oxide molecule", Bulletin of the American Physical Society, **(2016).**

[6] E. Irani, M. Monfared**, "**Exploration of High-Harmonic Generation from Interaction of Optimized Intense Short Laser Field with N_2O Molecule using Time Dependent Density Functional Theory (TDDFT)", Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy, (2018).

[7] **E.Irani**, "Ultra-short laser- molecule interaction for probing the ultra-fast electron dynamics" Humboldt University, Berlin, Germany, **(2018).**

[8] A. Ashrafi Belgabad, R. Karimi, P. Parvin, M. Monfared, K.Tian**, E. Irani**, B.Wales, E. Bisson, S. Beaulieu, M. Giguere, J. Clad Kieffer, F. Legare, J. Sanderson, "Interaction of ultra-short laser pulses with OCS molecules and determination of orientation of the (2,2,2) channel ", 32nd International Conference on Photonic, Electronic and Atomic Collisions**(2021).**

VIII. PhD and M.Sc. students:

PhD students:

[1] M. Monfared, Sharif university of technology, thesis: Optimization of high harmonic generation in interaction of strong femto-second laser with N_2O molecule (Advisor 2018), (Graduated).

[2] M. Koushki, Kashan University of technology, thesis: Dependence of the Molecular High-harmonic generation on the exchange-correlation potentials (Advisor 2016) (Graduated).

[3] Mahsa Pashazadeh, Uremia university of technology, thesis: Laser ablation of Titanium "experimental work" (Advisor 2018) (Graduated).

[4] Amin SadeghiFaraz, Tarbiat Modares University, thesis: "Optimization of high harmonic spectrum in semiconductor materials by time dependent density functional theory" (supervisor 2019) (Graduated).

[5] Yeganeh Alvankar , "Investigating nonlinear responses and topological properties of TMD materials using high harmonic generation"Tarbiat Modares University, (supervisor 2022).

[6] Hamid Talkhabi, Tarbiat Modares University, (supervisor 2023).

M.Sc students:

[1] A. Mostafai, Sharif university of technology, thesis: Study of alignment dependence of ionization probability of Cl_2, Br_2 and S_2 molecules by intense femto-second laser pulse, (2011) (Graduated).

[2] H. Omidvar, Azad university of technology, thesis: Gamma rays Transmutation of palladium by Bremsstrahlung and laser inverse compton scattering, (2012) (Graduated).

[3] S. Rasti, Sharif university of technology, thesis: Quantum optimal control of interaction ultra-short laser pulses with formaldehyde molecule, (2014) (Graduated).

[4] Ramin Akradi, Tarbiat Modares university, thesis: Ultra-short attosecond pulse generation from high-order harmonics in Bromine molecule, (2018) (Graduated).

[5] Mandana Hoseini, Tarbiat Modares university, (Advisor 2018) (Graduated).

[6] Zahra Hoseini, Tarbiat Modares university, thesis: Effect of laser polarization on the high harmonic generation from formaldehyde molecule (2020) (Graduated).

[7] Mohammad Rasoul Khodaverdi, Tarbiat Modares university, thesis: Investigating the structural features and physical properties of nanoparticles generated by laser ablation of Zn metal in liquid solution (2020) (Graduated).

[8] Ahmadreza Madhani, Tarbiat Modares university, thesis: Theoretical approach to single attosecond pulse generation with optical gating using time dependent density functional theory (2021) (Graduated) .

[9] Razieh Faghih latif, Tarbiat Modares university, thesis: “Investigation of symmetric effects of high harmonic spectra on WSe_2 semiconductor” (2022) (Graduated).

[10] Elaheh Rahimi , Tarbiat Modares university, thesis: “Investigation of nonlinear optical properties of materials with near-zero electrical conductivity-doped CdTe” (2022) (Graduated).

[11] Kasra Bouriaie, Tarbiat Modares university, thesis:” Investigation on the linear and nonlinear optical properties of iron- based metal-organic frameworks” (2022) (Graduated).

[12] Erfan heidary, Tarbiat Modares University, (2023).

[13] Faezeh Hoseini, Tarbiat Modares University, (2023).

COURSES TAUGHT:

- Quantum Optics (TMU)
- Nonlinear Optics (TMU)
- Photonics (TMU)
- Advanced Electrodynamics (TMU)
- Laser Physics (SUT, TA)
- Optics Lab. (SUT)
- Basic Physics Lab. (SUT)
- Mathematical Physics (Karaj University)

LANGUAGES:

English (fluent), Farsi (Native language), Turkey (Native Language), Arabic (Some information).

COMPUTER SKILLS:

Computer skill: GAUSSIAN package, GAUSSIAN VIEW, GAMESS, OCTOPUS, Berkeley GW, ZEMAX, COMSOL , Fortran, C++ programming, Matlab.