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Education

- 2014–2017 | **PhD in Physics**
Sakarya University
Thesis: *Investigating superconductivity in body centered tetragonal structures using density functional theory*
- 2011–2014 | **M.S. in Physics**
Gebze Institute of Technology
Thesis: *Exchange bias properties of magnetic materials with perpendicular anisotropy.*
- 2006–2010 | **B.S. in Physics**
Sakarya University

Research Experience

- 2017/04–
present | **Lecturer**
Sakarya University
- 2020/10–
202110 | **Postdoctoral Researcher**
University of York, UK
- 2024/02– | **Postdoctoral Researcher**
Institute of Physics, Zagreb, CROATIA

Projects

- 1-) Theoretical prediction of the highest superconducting temperature in the hexagonal RT_3X_2 (R: rare earth metal; T: transition metal; X: Si,B) structure,) (2023-2026). Funded by the Scientific and Technological Research Council of Turkey (TUBITAK).
- 2-) Theoretical examination of electron-phonon interaction and superconductivity in some M_2AX phases (M: transition metal, A: a group IIIA or IV A element and X: C) (2021-2022). Funded by the Scientific and Technological Research Council of Turkey (TUBITAK).
- 3-) Investigation of Superconductivity Properties of Ta_3Sb Compound Using Density Functional Theory (2019-2020). Funded by Sakarya University.
- 4-) Investigation of the Physical Properties of $LaPd_2Ge_2$ using The Density Functional Theory (2019-2020). Funded by Sakarya University.
- 5-) Investigation of Physical Properties of β - Bi_2Pd , $ScNi_2B_2C$, $La_3Ni_2B_2N_3$, $CaPd_2Ge_2$ Materials Using Density Functional Theory (2018-2019). Funded by Sakarya University.
- 6-) Investigation of Physical Properties of $ScNi_2B_2C$ Material Using Density Functional Theory (2018-2018). Funded by Sakarya University.
- 7-) Density Functional Theory of Superconductivity in Body-Centered Tetragonal Structures (2017-2017). Funded by Sakarya University.

8-) Theoretical investigation of superconductivity in ThCr_2Si_2 and $\text{LuNi}_2\text{B}_2\text{C}$ type superconductors using density functional theory (2014-2017). Funded by the Scientific and Technological Research Council of Turkey (TUBITAK).

9-) Unidirectional exchange interaction anisotropy in Pt and Ti doped NiMn systems (2013-2014).). Funded by Gebze Institute of Technology.

10-) Preparation and Characterization of $\text{Ca}_3\text{Co}_4\text{O}_9$ Thermoelectric Materials (2013-2014).). Funded by Gebze Institute of Technology.

11-) Electrical Effect of Exchange Bias in Pt/Co/CoO and Pt/Co/IrMn Thin Films with Perpendicular Magnetism Field Manipulation (2013-2014). Funded by the Scientific and Technological Research Council of Turkey (TUBITAK).

Publications

1-) E.Karaca, D. Errandonea, "Tuning the electronic and vibrational properties of $\text{Sn}_2\text{P}_2\text{S}_6$: Pressure induced metallization and superconductivity" *Results in Physics*, 57 (2024) 107330.

2-) E.Karaca, D. Errandonea, "High-pressure effect on the superconductivity of NaAlGe and pressure-induced structural phase transition" *Results in Physics*, 50 (2023) 106581.

3-) E.Karaca, E.Karaca, P. J. P. Byrne, P. J. Hasnip, M. I. J. Probert, "Cr₂AlN and the search for the highest temperature superconductor in the M₂AX family" *Scientific Reports*, 13 (2023) 6576

4-) H. M. Tütüncü, Ertuğrul Karaca, S. Bağcı, H. Y. Uzunok, "The effect of the spin-orbit coupling on the physical properties of ScGa_3 and LuGa_3 superconductors" *Vacuum*, 210 (2023) 111864.

5-) H. M. Tütüncü, Ertuğrul Karaca, S. Bağcı, H. Y. Uzunok, G. P. Srivastava, "Role of spin-orbit coupling on the physical properties of APb_3 (A = Na, Ca, Y, and Th) superconductors." *Physica C: Superconductivity and its Applications*, 608 (2023) 1354250

6-) A. El-Hajj, H. Y. Uzunok, H. M. Tütüncü, E. Karaca, G. P. Srivastava, "Impact of spin-orbit coupling on physical properties and superconductivity in noncentrosymmetric superconductors Ru_7B_3 and Re_7B_3 " *Physica B: Condensed Matter*, 655 (2023) 414743.

7-) E.Karaca, P. J. P. Byrne, P. J. Hasnip, M. I. J. Probert, "Prediction of phonon-mediated superconductivity in new Ti-based M₂AX phases" *Scientific Reports*, 12 (2022) 13198.

8-) E. Karaca, S. Bağcı, M. Tepeçinar, H.Y. Uzunok, H.M. Tütüncü, "Physical properties and superconductivity in the cubic A15-type Ta_3Ge " *Solid State Communications*, 353 (2022) 114838.

9-) E.Karaca, P. J. P. Byrne, P. J. Hasnip, H.M. Tütüncü, M. I. J. Probert, "Electron-phonon interaction and superconductivity in hexagonal ternary carbides Nb_2AC (A: Al, S, Ge, As and Sn)" *Electronic Structure*, 3 (2021) 045001.

10-) S. Saib, H. Y. Uzunok, Ertuğrul Karaca, S. Bağcı, H. M. Tütüncü, G. P. Srivastava, "First-principles calculations of physical properties and superconductivity of orthorhombic Mo_2BC and Nb_2BN " *Journal of Applied Physics*, 130 (2021)153902.

11-) H. Y. Uzunok, A. El-Hajj, , H. M. Tütüncü, Ertuğrul Karaca, G. P. Srivastava, "Impact of spin-orbit coupling on the physical properties and superconductivity of Ir-rich superconductor $\text{Mg}_2\text{Ir}_3\text{Si}$: A first-principles investigation" *Journal of Physics and Chemistry of Solids*, 153 (2021) 110030.

12-) H. Y. Uzunok, T. Zafer, , H. M. Tütüncü, Ertuğrul Karaca, Bağcı S., G. P. Srivastava, "Probing physical properties and superconductivity of noncentrosymmetric superconductors LaPtGe and LaPtGe_3 : A first-principles study" *Computational Materials Science*, 185 (2020) 109949.

13-) H. Y. Uzunok, Bağcı S., Ertuğrul Karaca, H. M. Tütüncü, G. P. Srivastava, "First-principles calculations of physical properties and superconductivity of orthorhombic ScRuSi and ZrRhSi " *Phys. Rev. B*, 102 (2020) 134508.

14-) H. M. Tütüncü, B. Taslipinar, H. Y. Uzunok, Ertuğrul Karaca, S. Bağcı, "Probing the physical and superconducting properties of hexagonal ZrRuAs : A first-principles calculation" *Physica C*, 577 (2020) 1353715.

- 15-) M. Kuru, T. Sasmaz, Ertuğrul Karaca, S. Bağcı, "Dielectric, magnetic and humidity properties of Mg–Zn–Cr ferrites" *Journal of Alloys and Compounds*, 836 (2020) 155318.
- 16-) H. Y. Uzunok, H. M. Tütüncü, Ertuğrul Karaca, G. P. Srivastava, "The effect of spin–orbit interaction on superconductivity in the filled skutterudites $\text{MPt}_4\text{Ge}_{12}$ (M=Ba, Sr and Th)" *Philosophical Magazine*, (2020) 1-24.
- 17-) H. M. Tütüncü, Ertuğrul Karaca, H. Y. Uzunok, Bağcı S., G. P. Srivastava, "A first- principles investigation of physical properties and superconductivity of NbPS" *Solid State Sciences*, 103 (2020) 106183.
- 18-) H. Y. Uzunok, Ertuğrul Karaca, Bağcı S., H. M. Tütüncü, "Physical properties and superconductivity of Heusler compound LiGa_2Rh : A first-principles calculation" *Solid State Communications*, 311 (2020) 113859.
- 19-) S. Saib, Ertuğrul Karaca, H. Y. Uzunok, H. M. Tütüncü, G. P. Srivastava, "Probing the electron–phonon interaction in superconductivity for KSn_2 using the Migdal-Eliashberg theory and linear-response theory" *Philosophical Magazine Letters*, 100 (2020) 33-54.
- 20-) Bağcı S., M. Cin, H. Y. Uzunok, Ertuğrul Karaca, H. M. Tütüncü, G. P. Srivastava, "Investigating the normal state and superconducting state properties of orthorhombic and hexagonal ZrRuP : A first-principles study" *Phys. Rev. B* 100 (2019) 184507.
- 21-) H. M. Tütüncü, Ertuğrul Karaca, H. Y. Uzunok, G. P. Srivastava, "Physical properties of hexagonal BaPtAs with noncentrosymmetric SrPtSb -type and centrosymmetric YPtAs -type crystal structures: Effects of spin-orbit coupling" *Phys. Rev. B* 100 (2019) 174507.
- 22-) Ertuğrul Karaca, "Theoretical investigation of the superconductivity mechanism of BaIr_2As_2 " *Physica C* 563 (2019) 42-47.
- 23-) H. M. Tütüncü, H. Y. Uzunok, Ertuğrul Karaca, Bağcı S., G. P. Srivastava, "Ab initio investigation of spin orbit coupling effect on the physical properties of IrGe superconductor" *Intermetallics* 106 (2019) 107-114.
- 24-) H. Y. Uzunok, H. M. Tütüncü, Ertuğrul Karaca, G. P. Srivastava, "Theoretical investigation of antisymmetric spin-orbit coupling effect on the physical properties of noncentrosymmetric BaPtSb superconductor" *Intermetallics* 108 (2019) 109-116.
- 25-) H. Y. Uzunok, H. M. Tütüncü, Ertuğrul Karaca, G. P. Srivastava, "Theoretical investigation of superconductivity mechanism in the filled skutterudites $\text{YRu}_4\text{P}_{12}$, $\text{YOs}_4\text{P}_{12}$, $\text{LaOs}_4\text{P}_{12}$ and $\text{LaOs}_4\text{As}_{12}$ " *Journal of Physics and Chemistry of Solids* 130 (2019) 197–209.
- 26-) Ertuğrul Karaca, Bağcı S., H. M. Tütüncü, H. Y. Uzunok, G. P. Srivastava, "Theoretical investigation of electron-phonon interaction in the orthorhombic phase of Mo_2C " *Journal of Alloys and Compounds* 788 (2019) 842-851.
- 27-) H. Y. Uzunok, H. M. Tütüncü, Ertuğrul Karaca, G. P. Srivastava, "Ab initio investigation of electron-phonon interaction in LaSn_3 and CaSn_3 " *Philosophical Magazine Letters* 98 (2018) 375-391.
- 28-) N. Güy, K. Atacan, E. Karaca, M. Özacar, "Role of Ag_3PO_4 and Fe_3O_4 on the photocatalytic performance of magnetic $\text{Ag}_3\text{PO}_4/\text{ZnO}/\text{Fe}_3\text{O}_4$ nanocomposite under visible light irradiation" *Solar Energy* 166 (2018) 308–316.
- 29-) H. M. Tütüncü, Ertuğrul Karaca, H. Y. Uzunok, and G. P. Srivastava, "Role of spin-orbit coupling in the physical properties of LaX_3 (X=In, P, Bi) superconductors" *Phys. Rev. B* 97 (2018) 174512.
- 30-) HM Tütüncü, HY Uzunok, E Karaca, E Arslan, GP Srivastava, "Effects of spin-orbit coupling on the electron-phonon superconductivity in the cubic Laves-phase compounds CaIr_2 and CaRh_2 " *Phys. Rev. B* 96 (2017), 134514
- 31-) HM Tütüncü, E Karaca, GP Srivastava, "Electron–phonon interaction and superconductivity in the borocarbide superconductor $\text{ScNi}_2\text{B}_2\text{C}$ " *Philosophical Magazine* 97 (2017), 2669-2688.
- 32.) E Karaca, E Arslan, HM Tütüncü, GP Srivastava, "Physical properties of the body- centred tetragonal CaPd_2Ge_2 " *Philosophical Magazine* 97 (2017), 1866-1883.
- 33.) HM Tütüncü, E Karaca, GP Srivastava, "Electron-phonon superconductivity in the filled skutterudites, $\text{LaRu}_4\text{P}_{12}$, $\text{LaRu}_4\text{As}_{12}$ and $\text{LaPt}_4\text{Ge}_{12}$ " *Phys. Rev. B* 95 (2017), 214514.
- 34-) S. Saib, Ertuğrul Karaca, H. M. Tütüncü, G. P. Srivastava, "Electron-phonon interaction and superconductivity in the multiband superconductor $\beta\text{-Bi}_2\text{Pd}$ " *Intermetallics* 84 (2017) 136-141.

- 35-) H. M. Tütüncü, Ertuğrul Karaca, G. P. Srivastava, "Electron-phonon interaction and superconductivity in the $\text{La}_3\text{Ni}_2\text{B}_2\text{N}_3$ " *Phil. Mag.* 97, (2017), 128
- 36-) Ertuğrul Karaca, H. M. Tütüncü, G. P. Srivastava, S. Uğur, "Electron-phonon superconductivity in the ternary phosphides BaM_2P_2 ($M = \text{Ni}, \text{Rh}, \text{and Ir}$)" *Phys. Rev. B* 94 (2016) 054507
- 37-) Ertuğrul Karaca, S. Karadağ, H. M. Tütüncü, G. P. Srivastava, S. Uğur, "First-principles investigation of superconductivity in the body-centred tetragonal LaRu_2P_2 " *Phil. Mag.* 96, (2016), 2059.
- 38-) H. M. Tütüncü, Ertuğrul Karaca, G. P. Srivastava, "Ab initio investigation of superconductivity in orthorhombic MgPtSi " *Journal of Alloys and Compounds* 673 (2016) 302-308.
- 39-) Enes Arslan, Ertuğrul Karaca, H. M. Tütüncü, A. Başoğlu, G. P. Srivastava, "Theoretical investigation of superconductivity in SrAuSi_3 and SrAu_2Si_2 " *Journal of Physics and Chemistry of Solids* 95 (2016) 65–73.
- 40-) H. M. Tütüncü, Ertuğrul Karaca, G. P. Srivastava, "Theoretical investigation of superconductivity in ternary silicide NaAlSi with layered diamond-like structure" *Phil. Mag.* 96, (2016), 1006.
- 41-) Ertuğrul Karaca, H. M. Tütüncü, H. Y. Uzunok, G. P. Srivastava and S. Uğur, "Theoretical investigation of superconductivity in SrPd_2Ge_2 , SrPd_2As_2 , and CaPd_2As_2 " *Phys. Rev. B* 93 (2016) 054506.
- 42-) H. M. Tütüncü, Ertuğrul Karaca, G. P. Srivastava, "Ab initio calculations of surface phonons of the hydrogen-terminated $\text{Si}(110)-(1 \times 1)$ surface" *Surf. Sci.* 647 (2016) 17-25.
- 43-) H. M. Tütüncü, H. Y. Uzunok, Ertuğrul Karaca, G. P. Srivastava, S. Özer and S. Uğur, "Ab initio investigation of BCS-type superconductivity in $\text{LuNi}_2\text{B}_2\text{C}$ -type superconductors" *Phys. Rev. B* 92 (2015) 054510.
- 44-) E. Karaca, M. Şatır, S. Kazan, M. Acıkgöz, E. Öztürk, G. Gürdağ, D. Ulutaş, "Synthesis, characterization and magnetic properties of Fe_3O_4 doped chitosan polymer", *Journal of Magnetism and Magnetic Materials*, 373 (2015) 53-59.

Conference Proceedings

- 1-) E. Karaca, F. Kurtuluş, S. Bağcı, H.M. Tütüncü (2022). Physical Properties and Superconductivity of Ta_3Sb : An Abinitio Study. TFD-38. (Oral Presentation)
- 2-) F. Kurtuluş, S. Bağcı, E. Karaca, H.M. Tütüncü (2022). The Structural, Elastic and Electronic Properties of Nb_3X (X: Ir, Pt, Rh). TFD-38 (Oral Presentation)
- 3-) Al-Chalabi Israa A., S. Bağcı, E. Karaca, H.Y. Uzunok, H.M. Tütüncü (2022). Structural, Electronic and Superconducting Properties of WRuP . TFD-38. (Oral Presentation)
- 4-) T. Zafer, E. Karaca, H.Y. Uzunok, H.M. Tütüncü, S. Bağcı, G.P. Srivastava G P (2019). First Principle Pseudopotential Calculation of Superconductivity and Electron-Phonon Interaction in the Body Centered Tetragonal LaPd_2Ge_2 . Turkish Physical Society 35th International Physics Congress. (Oral Presentation)
- 5-) E. Karaca, S. Bağcı, H.M. Tütüncü, H.Y. Uzunok, G.P. Srivastava (2019). Theoretical Investigation of Superconductivity in Mo_2C . Turkish Physical Society 35th International Physics Congress. (Oral Presentation)
- 6-) E. Karaca (2019). Ab Initio Investigation of Spin Orbit Coupling Effect on The Physical Properties of BeAu Superconductor. Turkish Physical Society 35th International Physics Congress. (Oral Presentation)
- 7-) E. Karaca (2019). Ab Initio Study of Superconductivity and Electron-phonon Interaction in the Tetragonal BiLi . XXXIX. Dynamics Days Europe. (Oral Presentation)
- 8-) H.M. Tütüncü, E. Karaca, H.Y. Uzunok, G.P. Srivastava, S. Bağcı (2018). Spin-Orbit Interaction Effect on Superconductivity in the Filled Skutterudites $\text{XPt}_4\text{Ge}_{12}$ ($\text{X} = \text{Ba}, \text{Sr}, \text{and Th}$). International Congress On The World Of Technology and Advanced Materials. (Oral Presentation)
- 9-) H.M. Tütüncü, E. Karaca, H.Y. Uzunok, S. Bağcı, G.P. Srivastava (2018). Theoretical investigation of superconductivity in the borocarbide superconductor $\text{ScNi}_2\text{B}_2\text{C}$. Turkish physical Society 34th International Physics Congress. (Oral Presentation)

- 10-) H.M. Tütüncü, H.Y. Uzunok, E. Karaca, G.P. Srivastava (2018). Spin-Orbit Interaction Effect on The Superconductivity in the Cubic Laves-Phase Compounds CaRu_2 and CaRh_2 . Turkish Physical Society 34th International Physics Congress. (Oral Presentation)
- 11-) A. A. Doaa, S. Bağcı, E. Karaca, H.M. Tütüncü (2018). Elastic properties of ABF_3 (A:Ag,K and B:Mg, Zn) perovskites. Turkish Physical Society 34th International Physics Congress. (Oral Presentation)
- 12-) H.M. Tütüncü, E. Karaca, H.Y. Uzunok, G.P. Srivastava (2018). Physical Properties of LaX_3 (X=In, P, Bi) Superconductors with Spin-Orbit Interaction. Turkish Physical Society 34th International Physics Congress. (Oral Presentation)
- 13-) H.M. Tütüncü, E. Karaca, H.Y. Uzunok, S. Bağcı, G.P. Srivastava (2018). Electron-phonon interaction and superconductivity in the filled skutterudites $\text{LaRu}_4\text{P}_{12}$, $\text{LaRu}_4\text{As}_{12}$, and $\text{LaPt}_4\text{Ge}_{12}$. Turkish Physical Society 34th International Physics Congress. (Oral Presentation)
- 14-) A. A. Doaa, S. Bağcı, E. Karaca, H.M. Tütüncü (2018). Structural, Elastic and Dynamical Properties of AgCoF_3 . Turkish Physical Society 34th International Physics Congress. (Oral Presentation)
- 15-) E. Karaca, E. Arslan, H.M. Tütüncü, G.P. Srivastava (2016). Ab initio Calculation of Superconductivity and Electron-Phonon Interaction in the Body Centered Tetragonal CaPd_2Ge_2 . 2nd International Congress on The World of Technology and Advanced Materials. (Poster Presentation)
- 16-) E. Karaca, H.M. Tütüncü, S. Karadağ, G.P. Srivastava, Ş. Uğur (2016). Ab initio Calculation of Superconductivity and Electron-Phonon Interaction in the Body Centered Tetragonal LaRu_2P_2 . Spectroscopies in Novel Superconductors. (Poster Presentation)
- 17-) C. Boyraz, E. Karaca, S. Kazan, M. Özdemir, G. Arun (2016). Structural, Magnetic, and FMR Characteristics of Heterostructured Lithium Ferrite (LiFe_5O_8). 12th International Nanoscience and Nanotechnology Conference. (Poster Presentation)
- 18-) E. Karaca, H.M. Tütüncü, H.Y. Uzunok, G.P. Srivastava, Ş. Uğur (2015). Electron-Phonon Interaction and Superconductivity in SrPd_2Ge_2 with the Body Centered Tetragonal ThCr_2Si_2 Structure. 9th International Physics Conference of the Balkan Physical Union. (Poster Presentation)
- 19-) S. Karaman, H.Y. Uzunok, E. Karaca, H.M. Tütüncü, G.P. Srivastava, Ş. Uğur (2015). An AB INITIO Investigation of Superconductivity in the Body Centered Tetragonal $\text{LuNi}_2\text{B}_2\text{C}$ and $\text{LaPt}_2\text{B}_2\text{C}$. 9th International Physics Conference of the Balkan Physical Union. (Poster Presentation)
- 20-) E. Karaca, S. Kazan, C. Boyraz, M. Özdemir (2013). Effect of Ti and Bi doping on magnetization of layered $\text{Ca}_3\text{Co}_4\text{O}_9$. International Conference on Nanoscale Magnetism(ICNM-2013). (Poster Presentation)
- 21-) M. Şatır, E. Karaca, M. Açıkgöz, S. Kazan, E. Öztürk, T. Gürkankaynak Altınçekiç, G. Gürdağ (2013). Magnetic characterization of composite polymer. International Conference on Nanoscale Magnetism (ICNM-2013). (Poster Presentation)

Awards & Honors

- 2021 | The Scientific and Technological Research Council of Turkey (TUBITAK), Science Fellowships
- 2020 | Sakarya University, Early Career Scientist Grant
- 2010 | Graduated as Valedictorian of Physics in class 2010.