

Furkan Semih Dündar

Curriculum Vitae

Research Interests

Physics

- **Foundations of Physics.**
- **Interpretations of Quantum Mechanics.**
- **Wolfram Model.**
- **Shape Dynamics.**

Philosophy of Physics

- **Space.**
- **Time.**
- **Motion.**
- **Monads.**

Mathematics

- **Contact Geometry.**

Work

2019–Present **Assistant Professor**, *Amasya University.*

2016–2018 **Research Assistant**, *Boğaziçi University.*

Education

2016–2018 **PhD. in Physics**, *Boğaziçi University.*

2012–2014 **MSc. in Physics**, *Middle East Technical University.*

2007–2012 **BS. in Physics**, *Bilkent University.*

PhD. Thesis

Title *Quantum Phenomena and Shape Dynamics*

Advisor *Metin Arik and Levent Akant*

Master Thesis

Title *The Firewall Paradox*

Advisor Bayram Tekin

Awards and Honors

- 2015–2018 TÜBİTAK (PhD.) Scholarship
- 2012–2014 TÜBİTAK (MSc.) Scholarship
- 2012 Bilkent University, #1 Ranking in Graduation from the Physics Department
- 2012 Bilkent University, High Honor Degree
- 2007–2012 Bilkent University, Full Scholarship
- 2007–2012 TÜBİTAK (BS.) Scholarship

Referee for

- Classical and Quantum Gravity
- Modern Physics Letters A
- Mathematical Methods in the Applied Sciences
- Fundamental Journal of Mathematics and Applications
- Karamanoglu Mehmetbey University Journal of Engineering and Natural Sciences
- Journal of Smart Systems Research
- Sakarya University Journal of Science
- Bilecik Seyh Edebali University Journal of Science

Books

- Furkan Semih Dünder. *Kuantum Görelilik Kütleçekimi: Yeni fiziğin püf noktaları*. (Popular physics book in Turkish. The English translation of the title is "Quantum Relativity Gravitation") Say Yayınları. (November 4, 2020). ISBN: 9786050208092
- Furkan Semih Dünder. *The Firewall Paradox: What is wrong with quantum gravity*. Lap Lambert Academic Publishing (December 20, 2016). ISBN: 97833330021754

Physics Olympiads

I served as an instructor to Turkish Physics Olympiads Team in the following terms:

- 2020 Winter
- 2020 Summer
- 2021 Winter
- 2021 Summer
- 2022 Winter
- 2022 Summer

Contributions to the Open Source World

GitHub page: <https://github.com/fsdundar/>.

2022–Present **Co-lead for Qiskit Documentation Localization Project.**

2019–Present **Proofreader for Qiskit Documentation Localization Project.**

Scientific Projects

1. Furkan Semih Dünder (yürütücü/executive). "Wolfram Model kapsamında çeşitliliğin rolünün araştırılması" (en: Investigation of the role of variety in the context of Wolfram Model). TÜBİTAK 1002-A project. Project Number: 122F297. November 2022–November 2023
2. Furkan Semih Dünder (araştırmacı/researcher) "Cosmological models and gravitational objects in modified theories of gravity" Boğaziçi University BAP project. Project Number: 11643. May 2016–May 2019.

Publications

1. **Furkan Semih Dünder**. *A Use of Variety as a Law of the Universe*. Complex Systems. Vol. 31, Issue 2, pp. 247–260. (2022)
2. **Furkan Semih Dünder**. *A Use of Elliptic Complex Numbers in Newtonian Gravity*. Advances in Applied Clifford Algebras. Vol. 32, 20 (2022)
3. **Furkan Semih Dünder** and Gülhan Ayar. *Contact Hamiltonian Description of 1D Frictional Systems*. Communications in Advanced Mathematical Sciences. Vol. 4, Issue 2, pp. 100–107. (2021)
4. **Furkan Semih Dünder**. *Qubit Representation of Motion on the 2D Plane*. Karamanoglu Mehmetbey University Journal of Engineering and Natural Sciences. Vol. 3, Issue 1, pp. 1–6. (2021)
5. **Furkan Semih Dünder**. *Contact Hamiltonian Description of Systems with Exponentially Decreasing Force and Friction that is Quadratic in Velocity*. Fundamental Journal of Mathematics and Applications. Vol. 3, Issue 1, pp. 29–32. (2020)
6. Kahraman Esen Özen, **Furkan Semih Dünder**, Murat Tosun. *An Alternative Approach to Jerk in Motion Along a Space Curve with Applications*. Journal of Theoretical and Applied Mechanics. Vol. 57, Issue 2, pp. 435–444. (2019)
7. **Furkan Semih Dünder** and Metin Arık. *On the Non-Existence of Unbounded Discrete Space-Time*. Mathematical Advances in Pure and Applied Sciences. Vol. 1, Issue 2, pp. 52–55. (2018)
8. **Furkan Semih Dünder** and Metin Arık. *Bohmian Mechanics made Machian*. The Online Journal of Science and Technology. Vol. 8(3) p. 26 2018
9. **Furkan Semih Dünder** and Metin Arık. *Bohmian Field Theory on a Shape Dynamics Background and Unruh Effect*. Annals of Physics. Vol. 392, pp. 157–164. (2018) arXiv:1706.05890.
10. **Furkan Semih Dünder**, Soley Ersoy, Nuno T. Sá Pereira. *Bobillier formula for the elliptical harmonic motion*. An. St. Univ. Ovidius Constanta, Ser. Mat. Vol. 26. Issue 1, pp. 103–110. (2018)

11. **Furkan Semih Dündar** and Kamal Hajian. *Quantum Jump from Singularity to Outside of Black Hole*. JHEP 02 (2016) 175. arXiv:1511.03572

Conference Proceedings

1. Furkan Semih Dündar. *Maximal variety Leibnizian strings for large N* . 9th International Congress on Fundamental and Applied Sciences. İstanbul, Turkey, June 28–30, 2022. (Extended abstract appeared in the proceedings book)
2. Furkan Semih Dündar. *Invitation to Using n -Scale Calculus in Physics and Future Opportunities*. International Marmara Sciences Congress IMASCON 2020 - Autumn. Kocaeli, Turkey. December 4–5 2020. (Fulltext appeared in the proceedings book)
3. Furkan Semih Dündar. *Covid-19 and the Fibonacci Numbers*. 9th International Eurasian Conference on Mathematical Sciences and Applications. Skopje, North Macedonia. August 25–28 2020. (Appeared in the abstract book)
4. Furkan Semih Dündar. *The Theory of n -Scales*. AIP Conference Proceedings, vol. 1926, p. 020014, 2018. doi: 10.1063/1.5020463.
5. Furkan Semih Dündar and Barış Tamer Tonguç. *Quantum Shape Kinematics*. The Proceeding Book of International Science and Technology Conference 2016. Page 855. November 18, 2016. arXiv:1511.05840

Popular Science Publications

1. Furkan Semih Dündar. *Fizikte hücresel otomatlar hakkında* (en: About cellular automata in physics), Bilim ve Ütopya, January 2023.
2. Furkan Semih Dündar. *Süperdeterminizm* (en: Superdeterminism), Bilim ve Ütopya, December 2022.
3. Furkan Semih Dündar. *Hayalimdeki bilim insanı* (en: My dream scientist), Bilim ve Ütopya, November 2022.
4. Furkan Semih Dündar. *Azami çeşitli evren: Bir oyuncak model* (en: Maximal variety universe: A toy model), Bilim ve Ütopya, October 2022.
5. Furkan Semih Dündar. *Kuantum mekaniğinin yorumları* (en: Interpretations of quantum mechanics), Bilim ve Ütopya, September 2022.
6. Furkan Semih Dündar. *Zamanın yönü problemi* (en: The arrow of time problem), Bilim ve Ütopya, July 2022.
7. Furkan Semih Dündar. *Gökadamızın merkezindeki karadelik objektiflere yakalandı!* (en: The black hole at the center of our galaxy has been caught on camera!), Bilim ve Ütopya, June 2022.
8. Furkan Semih Dündar. *Yapay zeka çağında matematik eğitimi* (en: Mathematics education in the age of AI), Bilim ve Ütopya, May 2022.
9. Furkan Semih Dündar. *Wolfram Model* (en: Wolfram Model), Bilim ve Ütopya, April 2022.
10. Furkan Semih Dündar. *Burçin Ünlü'nün "Büyük buluşma: Fizik ve sanat" yazısı üzerine* (en: On Burçin Ünlü's "Büyük buluşma: Fizik ve sanat"), Bilim ve Ütopya Portalı, September 2020.

11. Furkan Semih Dünder. *Hossenfelder'in "Lost in Math"i üzerine* (en: On Hossenfelder's "Lost in Math"), Bilim ve Ütopya Portalı, March 2020.
12. Furkan Semih Dünder. *Kuantum fotokopiye izin yok* (en: Quantum Xeroxing is not allowed), QTurkey, February 2020.
13. Furkan Semih Dünder. *Kuantum bilgi ve kuantum ışınlama* (en: Quantum information and quantum teleportation), Bilim ve Ütopya, February 2020.
14. Furkan Semih Dünder. *Kurumsal fizik mümkün. Peki ya sonrası?* (en: Corporate physics is possible. What's next?), Bilim ve Ütopya Portalı, February 2020.
15. Furkan Semih Dünder. *Rovelli'nin yedi kısa dersi hakkında* (en: On Rovelli's seven brief lessons), Bilim ve Ütopya Portalı, November 2019.
16. Furkan Semih Dünder. *Kurumsal fizik mümkün mü?* (en: Is corporate physics possible?), Bilim ve Ütopya Portalı, August 2019.
17. Furkan Semih Dünder. *Atwood Makinesi'nin anlamı* (en: The meaning of Atwood's Machine), Bilim ve Ütopya Portalı, August 2019.
18. Furkan Semih Dünder. *Evrende tüm yönler eşit midir?* (en: Are all the directions in the universe equal?), Bilim ve Ütopya Portalı, July 2019.
19. Furkan Semih Dünder. *Schrödinger'in Kedisi'nin kökeni* (en: The origin of Schrödinger's Cat), Bilim ve Ütopya Portalı, July 2019.
20. Furkan Semih Dünder. *Karanlık madde, karanlık enerji ve modifiye kütleçekim kuramları* (en: Dark matter, dark energy and modified gravity theories). Bilim ve Ütopya Portalı. June 2019.
21. Furkan Semih Dünder. *Fizik için özgür yazılımlar* (en: Free softwares for physics). Bilim ve Ütopya Portalı. May 2019.
22. Furkan Semih Dünder. *Kara deliğin gölgesi üzerine kısaca* (en: Briefly on the shadow of the black hole). Bilim ve Ütopya Portalı. April 2019.
23. Furkan Semih Dünder. *Bilimsel ilerleme zinciri ve güven* (en: The chain of scientific advancement and trust). Bilim ve Ütopya Portalı. April 2019.
24. Furkan Semih Dünder. *Kopenhag yorumuna bir alternatif: Bohm mekaniği* (en: An alternative to Kopenhagen interpretation: Bohmian mechanics). Bilim ve Ütopya Portalı. March 2019.
25. Furkan Semih Dünder. *Einstein'dan Barbour'a: Şekil dinamiğinin kısa tarihi* (en: From Einstein to Barbour: A brief history of shape dynamics). Bilim ve Ütopya. March 2019.
26. Furkan Semih Dünder. *Kara delik nedir? Gerçek midir?* (en: What is a black hole? Is it real?). Bilim ve Ütopya Portalı. February 2019.
27. Furkan Semih Dünder. *Postmodern bilime tutunabilmek* (en: Being able to hold onto postmodern science). Bilim ve Ütopya Portalı. December, 2018.
28. Furkan Semih Dünder. *Sınırsız ayrık uzay-zamanın yokluğu üzerine* (en: On the nonexistence of unbounded discrete space-time). Bilim ve Ütopya Portalı. November 2018.
29. Furkan Semih Dünder and Sadık Şamilov. *Kuantum kütleçekimine giriş* (en: Introduction to quantum gravity). Bilim ve Ütopya. November 2018.
30. Furkan Semih Dünder. *Riemann Hipotezi* (en: Riemann Hypothesis). Bilim

ve Ütopya Portalı. October 2018.

31. Furkan Semih Dünder. *Şekil Dinamiğine Giriş* (en: Introduction to Shape Dynamics). Bilim Fili. June 2018. <https://bilimfili.com/sekil-dinamigine-giris/>
32. Furkan Semih Dünder. *Mach İlkesi Nedir?* (en: What is Mach's Principle). BilimFili. June 2018. <https://bilimfili.com/mach-ilkesi-nedir/>
33. Furkan Semih Dünder. *Stephen Hawking ve Kara Delikler* (en: Stephen Hawking and Black Holes). Bilim ve Ütopya. April 2018.
34. Furkan Semih Dünder. *Mutlak Uzak* (en: Absolute Space). Bilim ve Teknik. May 2016.
35. Furkan Semih Dünder. *Kütleçekim Dalgaları İlk Kez Gözlemlendi!* (en: Gravitational waves has first been observed). Bilim ve Teknik, March 2016.
36. Furkan Semih Dünder. *İzafiyet kuramı ve kara delikler* (en: Relativity and Black Holes). SAÜ Aktüel 2015.
37. Furkan Semih Dünder. *Karadeliğin Ateşten Seddi* (en: Black Hole's Wall of Fire). Bilim ve Teknik, February 2014.

Workshops and Conferences

- August 2020 **9th International Eurasian Conference on Mathematical Sciences and Applications**, *International Balkan University*, Skopje, "Covid-19 and the Fibonacci Numbers".
- June 2018 **5th International Congress on Fundamental and Applied Sciences**, *International Balkan University*, Skopje, "Massive Scalar Field Theory on Discrete n -Scales".
- May 2018 **Mathematical Physics Days**, *Koç University*, İstanbul, "Gravitational Collapse of Thin Shell of Dust in Shape Dynamics".
- May 2018 **Recent Trends in String Theory and Related Topics**, *IPM*, Tehran, "Gravitational Collapse of Thin Shell of Dust in Shape Dynamics".
- Apr. 2018 **13. Ankara Matematik Günleri**, *TOBB ETÜ*, Ankara.
- Aug. 2017 **6th International Eurasian Conference on Mathematical Sciences and Applications**, Budapest, Hungary, "The Theory of n -Scales".
- Aug. 2017 **Astrofiziksel Diskler Yazokulu**, *Boğaziçi University*, İstanbul.
- July 2017 **Adım Physics Days VI**, *Balıkesir University*, Balıkesir, "An invitation to shape dynamics".
- May 2017 **Recent Trends in String Theory and Related Topics**, *IPM*, Tehran.
- July. 2016 **International Science and Technology Conference**, Wien.
- Dec. 2015 **International Conference on Quality in Higher Education**, *Sakarya University*, Sakarya.

- Sept. 2015 **International Science and Technology Conference**, St. Petersburg.
- Dec. 2014 **X Avogadro Meeting on Strings, Supergravity and Gauge Theories**, *Scuola Normale Superiore*, Pisa.
- April 2014 **13th Workshop on Quantization, Dualities and Integrable Systems**, *Koç University*, İstanbul.
- Sept. 2013 **Erdal İnönü Group Theory Summer School**, *Boğaziçi University and Bilim Akademisi*, İstanbul.
- July 2011 **Physics of Stars**, *ITAP*, Marmaris.

Past Teaching Duties

- 2022 Fall **MAT201: Diferansiyel Denklemler (Differential Equations)**, *Amasya University*, Turkey.
- 2022 Fall **MAT203: Olasılık ve İstatistik (Probability and Statistics)**, *Amasya University*, Turkey.
- 2022 Fall **MAK105: Lineer Cebir (Linear Algebra)**, *Amasya University*, Turkey.
- 2022 Fall **MAT201: Mühendislik Matematiği (Mathematics for Engineering)**, *Amasya University*, Turkey.
- 2022 Fall **GMAT201: Mühendislik Matematiği (Mathematics for Engineering)**, *Amasya University*, Turkey.
- 2022 Fall **FF1D501: Danışmanlık**, *Amasya University*, Turkey.
- 2022 Fall **FF1U503: Uzmanlık Alanı**, *Amasya University*, Turkey.
- 2022 Spring **FF1S538: Kuantum Programlama (Quantum Programming)**, *Amasya University*, Turkey.
- 2022 Spring **MAK 106: Bilgisayar Programlama (Computer Programming)**, *Amasya University*, Turkey.
- 2022 Spring **GMAK 106: Bilgisayar Programlama (Computer Programming)**, *Amasya University*, Turkey.
- 2022 Spring **MM 106: Bilgisayar Programlama (Computer Programming)**, *Amasya University*, Turkey.
- 2022 Spring **MAT 202: Diferansiyel Denklemler (Differential Equations)**, *Amasya University*, Turkey.
- 2022 Spring **GMAT 202: Diferansiyel Denklemler (Differential Equations)**, *Amasya University*, Turkey.
- 2022 Spring **MAT 102: Mathematics II (Calculus II)**, *Amasya University*, Turkey.

- 2022 Spring **MAT 204: Mühendislik Matematiği (Mathematics for Engineering)**, *Amasya University, Turkey.*
- 2022 Spring **MAK 408: Bitirme Çalışması (Graduation Project)**, *Amasya University, Turkey.*
- 2022 Spring **FF1D501: Danışmanlık**, *Amasya University, Turkey.*
- 2022 Spring **FF1U503: Uzmanlık Alanı**, *Amasya University, Turkey.*
- 2021 Fall **EEM 203: Olasılık ve İstatistik (Probability and Statistics)**, *Amasya University, Turkey.*
- 2021 Fall **GEEM 203: Olasılık ve İstatistik (Probability and Statistics)**, *Amasya University, Turkey.*
- 2021 Fall **MAT 203: Olasılık ve İstatistik (Probability and Statistics)**, *Amasya University, Turkey.*
- 2021 Fall **GMAT 203: Olasılık ve İstatistik (Probability and Statistics)**, *Amasya University, Turkey.*
- 2021 Fall **MAT 201: Mühendislik Matematiği (Mathematics for Engineering)**, *Amasya University, Turkey.*
- 2021 Fall **GMAT 201: Mühendislik Matematiği (Mathematics for Engineering)**, *Amasya University, Turkey.*
- 2021 Fall **MAT 101: Matematik I (Calculus I)**, *Amasya University, Turkey.*
- 2021 Fall **GMAT 101: Matematik I (Calculus I)**, *Amasya University, Turkey.*
- 2021 Fall **MAK 105: Lineer Cebir (Linear Algebra)**, *Amasya University, Turkey.*
- 2021 Fall **GMAK 105: Lineer Cebir (Linear Algebra)**, *Amasya University, Turkey.*
- 2021 Fall **MAK 401: İş Yeri Eğitimi (Workplace Training)**, *Amasya University, Turkey.*
- 2021 Fall **GMAK 401: İş Yeri Eğitimi (Workplace Training)**, *Amasya University, Turkey.*
- 2021 Spring **MAK 106: Bilgisayar Programlama (Computer Programming)**, *Amasya University, Turkey.*
- 2021 Spring **GMAK 106: Bilgisayar Programlama (Computer Programming)**, *Amasya University, Turkey.*
- 2021 Spring **MAT 202: Diferansiyel Denklemler (Differential Equations)**, *Amasya University, Turkey.*
- 2021 Spring **GMAT 202: Diferansiyel Denklemler (Differential Equations)**, *Amasya University, Turkey.*

- 2021 Spring **MAK408: Bitirme Çalışması (Graduation Project)**, *Amasya University, Turkey.*
- 2021 Spring **GMAK408: Bitirme Çalışması (Graduation Project)**, *Amasya University, Turkey.*
- 2020 Fall **MAK 105: Lineer Cebir (Linear Algebra)**, *Amasya University, Turkey.*
- 2020 Fall **GMAK 105: Lineer Cebir (Linear Algebra)**, *Amasya University, Turkey.*
- 2020 Fall **MAT 203: Olasılık ve İstatistik (Probability and Statistics)**, *Amasya University, Turkey.*
- 2020 Fall **GMAT 203: Olasılık ve İstatistik (Probability and Statistics)**, *Amasya University, Turkey.*
- 2020 Fall **MAK 401: İş Yeri Eğitimi (Workplace Training)**, *Amasya University, Turkey.*
- 2020 Fall **GMAK 401: İş Yeri Eğitimi (Workplace Training)**, *Amasya University, Turkey.*
- 2020 Fall **SSD1: Araştırma ve Rapor Hazırlama Teknikleri (Research and Report Preparation Techniques)**, *Amasya University, Turkey.*
- 2020 Fall **GSSD1: Araştırma ve Rapor Hazırlama Teknikleri (Research and Report Preparation Techniques)**, *Amasya University, Turkey.*
- 2020 Spring **MAK 106: Bilgisayar Programlama (Computer Programming)**, *Amasya University, Turkey.*
- 2020 Spring **GMAK 106: Bilgisayar Programlama (Computer Programming)**, *Amasya University, Turkey.*
- 2020 Spring **MAT 202: Diferansiyel Denklemler (Differential Equations)**, *Amasya University, Turkey.*
- 2020 Spring **GMAT 202: Diferansiyel Denklemler (Differential Equations)**, *Amasya University, Turkey.*
- 2020 Spring **SSD2: Entrepreneurship II**, *Amasya University, Turkey.*
- 2020 Spring **GSSD2: Entrepreneurship II**, *Amasya University, Turkey.*
- 2020 Spring **MAK408: Bitirme Çalışması (Graduation Project)**, *Amasya University, Turkey.*
- 2020 Spring **GMAK408: Bitirme Çalışması (Graduation Project)**, *Amasya University, Turkey.*
- 2018 Spring **Physics 442 Lab sessions**, *Boğaziçi University, Turkey.*
- 2018 Spring **Physics 101-121 Lab sessions**, *Boğaziçi University, Turkey.*

- 2017 Fall **Physics 101-121 Lab sessions**, *Boğaziçi University*, Turkey.
 2017 Spring **Physics 202 Lab sessions**, *Boğaziçi University*, Turkey.
 2016 Fall **Grader for Java Programming Course**, *Boğaziçi University*, Turkey.
 2016 Fall **Physics 101-121 Lab sessions**, *Boğaziçi University*, Turkey.
 2016 Spring **Physics 101-121 Lab sessions**, *Boğaziçi University*, Turkey.

Popular Science Activities

- 21–24 June 2016 **Science Festival**, *Sakarya*, Pozitif Bilimevi.
 2–5 Aug. 2011 **Astronomy and Physics Festival**, *Marmaris*, ITAP.
 7–10 Aug. 2011 **Astronomy and Physics Festival**, *Marmaris*, ITAP.
 27–30 Aug. 2011 **Astronomy and Physics Festival**, *Marmaris*, ITAP.
 2–5 Sept. 2011 **Astronomy and Physics Festival**, *Marmaris*, ITAP.
 19–20 Nov.. 2011 **Astronomy and Physics Festival**, *Marmaris*, ITAP.
 24–25 Mar. 2012 **Astronomy and Physics for Teachers**, *Marmaris*, ITAP.

Languages

Turkish	Native Speaker
English	Advanced
Persian	Elementary
Italian	Elementary
Russian	Elementary

Computer Skills

Machine Learning	Good	
C, C++	Good	<i>General purpose</i>
Mathematica	Good	<i>Symbolic calculations</i>
Matlab	Good	<i>Numerical calculations</i>
Adobe Illustrator	Intermediate	<i>Vector drawing</i>

Haskell	Intermediate	<i>Functional programming</i>
Python	Intermediate	<i>General purpose</i>
SciPy, Pandas	Intermediate	
Emacs	Good	<i>Including modifications</i>
ℒ _A T _E X	Good	<i>Also good at PGF macros for drawing</i>