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Born 31 October 1989

Turkish Citizen

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Last updated February 2020

Education

- 2018, Ph.D. in Physics, Harvard University, Cambridge, MA
- 2015, M.A. in Physics, Harvard University, Cambridge, MA
- 2013, B.S. in Physics (double major), Middle East Technical University (METU), Ankara, Turkey
- 2012, B.S. in Electrical and Electronics Engineering, METU, Ankara, Turkey
- 2008, High school diploma, Robert College, Istanbul, Turkey

Positions

- 2018-2021, Postdoctoral Kavli Fellow, MIT, Cambridge, MA, US
- 2013-2018, Research/Teaching Fellow, Harvard, Cambridge, MA, US
- 2011-2013, Teaching Assistant, METU, Ankara, Turkey

Research Interests

Fields: astro-particle physics, statistics, exoplanets and cosmology

PhD advisor: Douglas P. Finkbeiner

Record of my research output: my [NASA ADS](#), [Google Scholar](#), and [ORCID](#) profiles

Citation count: 721, h-index: 10 (retrieved from ADS)

- Cosmic-rays, Weakly Interacting Massive Particle (WIMP) self-annihilation, isotropic gamma-ray sky background,
- Transdimensional and Bayesian inference, probabilistic cataloging, machine learning, modeling and analysis of large data sets.
- Dark matter substructure, gravitational strong lensing, Lambda Cold Dark Matter (CDM) at small-scales.
- Exoplanet detection and characterization, planetary phase curves, exoplanet atmospheres, light curve and radial velocity (RV) data analysis.
- Analysis of data from NASA telescopes: TESS, HST, Chandra, Fermi-LAT and AMS-02.

Publications

Papers

1. Addison et al. TOI-257b (HD 19916b): A Warm sub-Saturn on a Moderately Eccentric Orbit Around an Evolved F-type Star. arXiv e-prints, page arXiv:2001.07345, Jan 2020. arXiv:2001.07345.
2. Gilbert et al. The First Habitable Zone Earth-sized Planet from TESS. I: Validation of the TOI-700 System. arXiv e-prints, page arXiv:2001.00952, Jan 2020. arXiv:2001.00952.
3. Shporer et al. GJ 1252 b: A 1.2 R planet transiting an M3-dwarf at 20.4 pc. arXiv e-prints, page arXiv:1912.05556, Dec 2019. arXiv:1912.05556.
4. Jordan et al. TOI-677 b: A Warm Jupiter ($P=11.2d$) on an eccentric orbit transiting a late F-type star. arXiv:1911.05574, Nov 2019.
5. Pepper et al. TESS Reveals HD 118203b to be a Transiting Planet. arXiv:1911.05150, Nov 2019.
6. Wong et al. Exploring the atmospheric dynamics of the extreme ultra-hot Jupiter KELT-9b using TESS photometry. arXiv:1910.01607, Oct 2019.
7. Daylan et al. TESS observations of the WASP-121 b phase curve. arXiv:1909.03000, Sep 2019.
8. Feder et al. Multiband Probabilistic Cataloging: A Joint Fitting Approach to Point Source Detection and Deblending. arXiv e-prints, page arXiv:1907.04929, Jul 2019. arXiv:1907.04929
9. Dawson et al. TOI-216b and TOI-216c: Two warm, large exoplanets in or slightly wide of the 2:1 orbital resonance. arXiv:1904.11852, Apr 2019.
10. Yu et al. Identifying Exoplanets with Deep Learning III: Automated Triage and Vetting of TESS Candidates. arXiv:1904.02726, Apr 2019.
11. Fausnaugh et al. Early Time Light Curves of 18 Bright Type Ia Supernovae Observed with TESS. arXiv:1904.02171, Apr 2019.
12. Espinoza et al. HD 213885b: A transiting 1-day-period super-Earth with an Earth-like composition around a bright ($V = 7.9$) star unveiled by TESS. arXiv:1903.07694, Mar 2019.
13. Guenther et al. A Super-Earth and two sub-Neptunes transiting the bright, nearby, and quiet M-dwarf TOI-270. arXiv:1903.06107, Mar 2019.
14. Bouma et al. WASP-4b Arrived Early for the TESS Mission. , 157(6):217, Jun 2019. arXiv:1903.02573, doi:10.3847/1538-3881/ab189f.
15. Rodriguez et al. An Eccentric Massive Jupiter Orbiting a Subgiant on a 9.5-day Period Discovered in the Transiting Exoplanet Survey Satellite Full Frame Images. , 157(5):191, May 2019. arXiv:1901.09950, doi:10.3847/1538-3881/ab11d9.
16. Quinn et al. Near-resonance in a system of sub-Neptunes from TESS. arXiv e-prints, page arXiv:1901.09092, Jan 2019. arXiv:1901.09092.
17. Guenther et al. Stellar Flares from the First TESS Data Release: Exploring a New Sample of M-dwarfs. arXiv e-prints, page arXiv:1901.00443, Jan 2019. arXiv:1901.00443.
18. Shporer et al. TESS Full Orbital Phase Curve of the WASP-18b System. , 157(5):178, May 2019. arXiv:1811.06020, doi:10.3847/1538-3881/ab0f96.

19. Schlafly et al. The DECam Plane Survey: Optical Photometry of Two Billion Objects in the Southern Galactic Plane. , 234(2):39, Feb 2018. arXiv:1710.01309, doi:10.3847/1538-4365/aaa3e2.
20. Daylan et al. The Small-scale Structure in Strongly Lensed Systems via Transdimensional Inference. , 854(2):141, Feb 2018. arXiv:1706.06111, doi:10.3847/1538-4357/aaaa1e.
21. Portillo et al. Improved Point-source Detection in Crowded Fields Using Probabilistic Cataloging. , 154(4):132, Oct 2017. arXiv:1703.01303, doi:10.3847/1538-3881/aa8565.
22. Daylan et al. Inference of Unresolved Point Sources at High Galactic Latitudes Using Probabilistic Catalogs. , 839(1):4, Apr 2017. arXiv: 1607.04637, doi:10.3847/1538-4357/aa679e.
23. Daylan et al. The characterization of the gamma-ray signal from the central Milky Way: A case for annihilating dark matter. Physics of the Dark Universe, 12:123, Jun 2016. arXiv: 1402.6703, doi:10.1016/j.dark.2015.12.005.

Proceedings

24. S. Schael et al. Precision measurements of the electron spectrum and the positron spectrum with AMS, 33rd International Cosmic Ray Conference, Rio De Janeiro, 2013
25. J. Casaus et al. Determination of the positron anisotropy with AMS, 33rd International Cosmic Ray Conference, Rio De Janeiro, 2013
26. V. Choutko et al. Precision Measurement of the Cosmic Ray Helium Flux with AMS Experiment, 33rd International Cosmic Ray Conference, Rio De Janeiro, 2013
27. S. Haino et al. Precision measurement of the proton flux with AMS, 33rd International Cosmic Ray Conference, Rio De Janeiro, 2013
28. A. Oliva et al. Precision Measurement of the Cosmic Ray Boron-to-Carbon Ratio with AMS, 33rd International Cosmic Ray Conference, Rio De Janeiro, 2013
29. B. Bertucci et al. Precision measurement of the $e^+ + e^-$ spectrum with AMS, 33rd International Cosmic Ray Conference, Rio De Janeiro, 2013

Awards, Honors and Achievements

- MIT Kavli Fellowship (2018)
- MIT Translational Fellowship (2018)
- AAS Chambliss Honorable Mention (2015)
- WorldQuant Fellowship (2014)
- Harvard Purcell Fellowship (2013)
- Winner of Bilkent Undergraduate Physics Research Competition (2013)
- Selected as a young researcher to attend the Lindau Nobel Laureates Meeting (2012)
- Featured by the Scientific American in the "30 under 30" list (2012)
- Honorable Mention Award, METU EEE graduation project (2012)

- Prof. Bülent Kerim Altay Award for the highest GPA in the class (twice, 2008 and 2009)
- Turkish Republic Prime Ministry Great Achievement Scholarship (2008-2012)
- Turkish Education Foundation Superior Success Scholarship (2008-2012)
- Technical Sciences Scholarship (2008)
- Ranked 10th (i.e., 99.999th percentile) in the National University Entrance Examination among 1.5 million participants (2008)

Software

- **Probabilistic Cataloger (PCAT)**, Daylan et al. 2017, Daylan et al. 2018, a transdimensional, hierarchical, and Bayesian framework to sample from the posterior probability distribution of a metamodel, i.e., union of models with different dimensionality, given some data.
<https://github.com/daylan/pcat>
<http://pcat.readthedocs.io>
- **Lion**, Portillo et al., 2017, a fast probabilistic cataloger for astronomical images
<https://github.com/stephenportillo/lion>
- **Allesfitter**, Guenther and Daylan, 2019, astronomy software package for modeling photometric and RV data.
<https://github.com/MNGuenther/allesfitter>
<https://allesfitter.readthedocs.io>

Grants

- Andrew Vanderburg et al. 2019, Disintegrating Rocky Bodies Transiting White Dwarfs: The Key To Understanding Exoplanet Compositions, TESS Guest Investigator Program, Cycle 2, ID G022077.
- Thomas Mikal-Evans et al. 2019, Atmospheric characterization of two temperate mini-Neptunes formed in the same protoplanetary nebula, HST Proposal, Cycle 27, ID 15814.

Service

- MIT Postdoctoral Association Human Affairs Chair (2019-)
- TESS Science Office Exoplanet Vetting Lead
- Reviewer for the Hubble Space Telescope (HST) proposals
- Reviewer for the Astrophysical Journal
- Reviewer for NASA FDL2018
- Exoplanet Atmospheres Session Chair, AAS235
- Editorial board member for the Turkish Journal of Physics (TJP)
- Local organizing committee member for the TESS Science Conference I
- Organizing committee member for the TUBITAK/TBAE research school "Gravitational Waves: New Challenges and Opportunities"

- Organizer of the MIT Exoplanet Journal Club
- NOAO Telescope Allocation Committee member
- Member of the science council for the East Anatolian Observatory (DAG)
- Research mentor for the Harvard-MIT Science Research Mentoring Program (SRMP)
- Session chair AAS235
- Mentor, American Physical Society, National Mentoring Community
- Mentor, MIT Mentor Advocate Partnership (MAP)

Teaching

- Summer 2019, Lecturer, Research summer school "Quantum to Cosmos: Ideas and Applications" , Istanbul, Turkey
- Spring 2019, Guest Lecturer for MIT Course 12S680, Artificial Intelligence for TESS Applications, MIT, Cambridge, MA
- Spring 2019, Guest Lecturer for Harvard Course Astro 130, Cosmology, Harvard, Cambridge, MA
- Fall 2016, Teaching Fellow, Graduate Cosmology, Harvard University, Cambridge, MA
- Spring 2015, Teaching Fellow, The Energetic Universe, Harvard University, Cambridge, MA
- Spring 2013, Fall 2012, Spring 2012, Teaching Assistant, Modern Physics, METU, Ankara, Turkey

Research mentoring

- MIT graduate student: Mariona Badenas-Agusti
- Harvard undergraduate student: Richard Feder-Staehle
- High school research interns: Rohan Subramani, Ashley Davidson, Kartik Pínglé, Jasmine Wright

Affiliations

- Since 2019, TESS Atmospheric Characterization Working Group
- Since 2019, TESS Follow-up Working Group
- Since 2018, TESS Objects of Interest Working Group
- Since 2016, American Physical Society
- Since 2014, American Astronomical Society
- Since 2014, Sigma XI Society
- 2011-2013, Associate member, CERN, Geneva, Switzerland
- 2011-2013, AMS-02 Collaboration, Geneva, Switzerland

Selected Talks

- *TESS phase curve of WASP-121b*, Yale University, 19 November 2019
- *TESS phase curve of WASP-121b*, University of Arizona, 30 October 2019
- *Probing the small-scale structure in strong lenses with PCAT*, MIT, 28 September 2018
- *Hunting for exoplanets with TESS*, Sabancı University, İstanbul, Turkey, 17 April 2019
- *A transdimensional perspective on dark matter*, METU, Ankara, Turkey, 16 April 2019
- *Hunting for exoplanets with TESS*, Robert College, İstanbul, Turkey, 12 April 2019
- *A transdimensional perspective on dark matter*, Boğaziçi University, İstanbul, Turkey, 10 April 2019
- *TESS phase curve of WASP-121b*, BAESM, Cambridge, MA, 5 April 2019
- *Probing the small-scale structure in strong lenses with PCAT*, JPL, Pasadena, CA, 4 March 2019
- *Recharacterization of previously known exoplanets in multi-sector TESS data*, AAS233, Seattle, WA, 6-10 January 2019
- *Highlights of Early Results - HATS13*, TESS Science Meeting 16, Cambridge, MA, 29 October 2019
- *PSF fitting with the TESS data*, TESS Science Meeting 15, Cambridge, MA, 6 August 2018
- *Probing the small-scale structure in strong lenses with PCAT*, TPS33, Bodrum, Turkey, 09 September 2017
- *Probing faint gamma-ray point sources in the inner Milky Way using PCAT*, TeVPA2017, Columbus, OH, 09 August 2017
- *Inner Milky Way Gamma Ray Excess*, Cape Cod Astronomical Society, 5 January 2017
- *Probing the GeV Excess using PCAT*, IDM2016, Sheffield, UK, 18 July 2016
- *Inference of Dim Gamma-Ray Point Sources Using Probabilistic Catalogues*, Dark Matter and Gamma Rays 2015, Obergurgl, Austria, 09 December 2015
- *Contribution of Dark Matter annihilations to the low-redshift metagalactic ionization rate*, DPF2015, Ann Arbor, MI, 06 August 2015
- *Can MSPs account for the gamma-ray excess in the inner Milky Way?*, EWASS2015, Tenerife, Spain, 25 June 2015
- *The Characterization of the Gamma-Ray Signal from the Central Milky Way*, Turkish Physical Society 31st International Physics Conference, Bodrum, Turkey, 23 July 2014
- *Scrutinizing the Diffuse Gamma-Ray Emission in the Inner Galaxy*, Astroparticle Physics 2014, Astroparticle Physics (TeVPA/IDM) 2014, Amsterdam, Netherlands, 26 June 2014
- *The Characterization of the Gamma-Ray Signal from the Central Milky Way*, Fermi Summer School, University of Delaware, Lewes, DE, 31 May 2014
- *Anomalous Gamma-Ray Emission from the Inner Galaxy*, Particle Seminar, Harvard University, Boston, MA, 07 May 2014

- *Photon Reconstruction In Calorimetric Mode*, AMS Collaboration Meeting, CERN, Geneva, Switzerland, 14 February 2013
- *Spacetime Around a Rotating Massive Object: Kerr Solution*, 27th International Physics Conference of Turkish Physical Society, Istanbul, Turkey, 15 September 2010
- *Hellenic Era Ancient Greek Thoughts and Ideas*, Lions Club Meeting, Istanbul, Turkey, 12 March 2007

Selected Poster Presentations

- *TESS phase curve of WASP-121b*, TESS Science Conference I, Cambridge, MA, 29 July - 2 August 2019
- *Recharacterization of previously known exoplanets in multi-sector TESS data*, Kepler Science Conference V, Glendale, CA, 4-8 March 2019
- *Scrutinizing the unresolved x-ray background in the CDFS field via transdimensional sampling*, the 16th AAS HEAD Meeting, Sun Valley, ID, 20-24 August 2017
- *Inference of Dim Gamma-Ray Point Sources Using Probabilistic Catalogues*, the 227th AAS Meeting, Kissimmee, FL, 07 January 2016
- *Inference of Dim Gamma-Ray Point Sources Using Probabilistic Catalogues*, 6th Fermi Symposium, Arlington, VA, 08 November 2015
- *Contribution of GeV Scale Dark Matter Annihilations to the Cosmic Ultraviolet Background*, the 225th AAS Meeting, Seattle, WA, 06 January 2015
- *GeV excess electrons upscattering the CMB: a possible resolution to the "Photon Underproduction Crisis"*, 5th Fermi Symposium, Nagoya, Japan, 20 October 2014
- *The Characterization of the Gamma-Ray Signal from the Central Milky Way*, Sackler Conference, Cambridge, MA, 19 May 2014

Selected Science Outreach

- Lecturer, The Project Science Voyagers, (2016-2018, addressed ~30,000 high school students)
- Lecturer, Turkish Ministry of Education e-conference, (2018, addressed 9,000 high school students)
- Lecturer, Astronomy in Schools (addressed 1500 high school students)
- First Lego League mentor
- Over 10 invited appearances on science outreach podcasts and interviews
- Over 100 science outreach talks to universities and high schools
- Author, Science & Utopia and Tree of Evolution
- Cambridge Explores the Universe, CfA, Cambridge, April 2016
- Ask a Scientist, Cambridge Science Festival, Cambridge, April 2016
- Sky & Space Day, Cambridge Science Festival, Cambridge, April 2015

- Lecturer, Beacon Hill Seminars, Cambridge, MA, (2014-2016)
- Lecturer, Science In The News Public Science Lectures, Cambridge, MA, (2014-2016)
- Author, Science In The News, 2014
- Lecturer, "There is a Scientist In My Classroom" Project, Cambridge, MA, 2013
- Organizer, Mobile CERN exhibition, METU, Ankara, Turkey, 2012

Coding

- Unix-like operating systems, Python, IDL, C++
- TensorFlow, Numpy, Numba, PyCUDA
- Relational databases, SQL
- MATLAB, Mathematica
- Jekyll, HTML5, JavaScript, CSS

Expertise

- Extensive modeling and analysis experience with astrophysical datasets collected by space and ground-based telescopes such as Fermi-LAT, Chandra, HST, SDSS, DECam, TESS, Kepler and AMS-02,
- Observing experience with the DECam on the 4m Blanco Telescope as part of DECam Plane Survey (DECaPS), 2016B-0279, CTIO, Cerro Tololo, Chile.
- Autonomous robot design, real-time image processing for self-localization

Selected Schools and Conferences Attended

- 27 May - 06 June 2014, Fermi Summer School 2014, Lewes, DE
- 28 May - 01 June 2013, Recent Developments in High Energy Physics and LHC, METU NCC, Cyprus
- 01 - 06 July 2012, Lindau Nobel Laureates Meeting, Lindau, Germany
- June - August 2011, Summer school on particle physics, CERN, Geneva, Switzerland
- June 2010, Summer school on nonrelativistic quantum mechanics, Bilkent University, Ankara, Turkey
- June - July 2007, Summer Research Program, Koç University, Istanbul, Turkey

Personal interests

- Lifelong aviator, holding a Private Pilot License since 2012
- Amateur radio operator, holding a ham radio license
- Partner dances: Tango and Bachata