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Dalya Baron

<https://dalyabaron.com>
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- Galaxy evolution
 - Active Galactic Nuclei
 - Machine learning
- Impact:** 26 scientific publications (16 as first author), 1 book, lecturer in 4 advanced schools on Machine Learning in Astrophysics, and PI/co-PI on 10 accepted observing proposals

EDUCATION & EMPLOYMENT

Carnegie-Princeton Fellow , Carnegie Observatories	2022 — present
Ph.D. in Physics , Astrophysics Department, Tel Aviv University	2019 — 2022
M.Sc. in Physics , Astrophysics Department, Tel Aviv University	2017 — 2019
B.Sc. in Physics , Tel Aviv University	2011 — 2017
B.Sc. in Electrical Engineering , Tel Aviv University	2011 — 2017

HONORS & AWARDS

Carnegie-Princeton Research Fellowship	2022–2026
The Asher Peres prize for excellent experimental PhD student Israel Physical Society	2021
The Adams fellowship for excellent graduate students Israel Academy of Sciences and Humanities	2020
The John Bahcall Prize for Excellence in Research School of Physics and Astronomy, Tel Aviv University	2020
The Wladimir Schreiber Excellence in Teaching Award School of Physics and Astronomy, Tel Aviv University	2019
The Wladimir Schreiber Excellence in Research Award School of Physics and Astronomy, Tel Aviv University	2019
Certificate of Merit for Exceptional Contribution to the TAU AstroClub Tel Aviv University	2018

CONFERENCE TALKS

Contributed talk: <i>Star-formation and molecular gas properties of post-starburst galaxies</i> Olympian Symposium: Star Formation in the JWST Era conference, Greece	2023
Invited talk: <i>Finding simple structures in complex datasets</i> Galaxy Formation and Evolution in the Data Science Era workshop, KITP	2023
Invited talk: <i>Facilitating new discoveries in large and complex datasets</i> Data Science in Astronomy, EAS	2021
Invited talk: <i>Finding simple structures in complex datasets</i> Machine Learning in Astronomy MiM, AAS 238	2021
Invited talk: <i>A multi-phased view of outflows in AGN host galaxies</i>	2021

Israel Physical Society online conference	
Invited talk: <i>A multi-phased view of outflows in AGN host galaxies</i>	2020
YAGN online conference	
Invited talk: <i>Finding simple structures in complex astronomical datasets</i>	2019
ML Tools for Research in Astronomy, Ringberg Castle	
Contributed talk: <i>A multi-wavelength census of outflows in type II AGN</i>	2019
IAUS 356	
Invited review talk: <i>Facilitating new discoveries in astronomy with machine learning</i>	2019
AI in Astronomy workshop, ESO	
Invited talk: <i>Finding simple structures in complex astronomical datasets</i>	2019
Astronomical time series conference, Heidelberg	
Invited talk: <i>Finding simple structures in complex astronomical datasets</i>	2018
Astroinformatics, Heidelberg	
Invited talk: <i>Searching for unknown structures and objects in large spectroscopic data sets</i>	2017
Astroinformatics, Cape Town	
Contributed talk: <i>Anomaly detection on galaxy spectra</i>	2017
Detecting the unexpected conference, STSCI	
Invited talk: <i>Transients in the Sloan Digital Sky Survey</i>	2015
Big data in astronomy conference, Tel Aviv	

SEMINARS & COLLOQUIA

<i>Star formation and multi-phase gas properties of galaxies in transition</i>	2023
astrophysics seminar, UC Riverside	
<i>Molecular gas and star formation properties of galaxies in transition</i>	2023
IPAC seminar, Caltech	
<i>The role of AGN feedback in galaxy evolution</i>	2023
Colloquium , Caltech	
<i>The role of AGN feedback in galaxy evolution</i>	2023
Colloquium , Santa Cruz	
<i>The Sequencer algorithm: finding sequences in astronomical datasets</i>	2023
TDA/Astroinformatics seminar, Caltech	
<i>A multi-phased view of outflows in active galaxies</i>	2020
University of Sheffield, Department of Astrophysics	
<i>A multi-wavelength study of outflows in type II AGN</i>	2020
Ben-Gurion University, Department of Astrophysics	
<i>A multi-wavelength study of outflows in type II AGN</i>	2020
Hebrew University, Department of Astrophysics	
<i>Massive AGN-driven winds in post starburst E+A galaxies</i>	2018
MPE, Garching	
<i>Finding simple structures in complex astronomical datasets</i>	2018

MPE, Garching	
<i>Automatic detection of structure in large and complex datasets</i>	2017
ETH Zurich, Department of Astrophysics	
<i>The sequencer - a novel algorithm for complex structure detection</i>	2017
Johns Hopkins University, Cosmology meeting	
<i>Finding the weirdest objects in astronomical surveys</i>	2017
Hebrew University, Department of Astrophysics	
<i>The weirdest SDSS galaxies: results from an outlier detection algorithm</i>	2017
Weizmann Institute, Department of Astrophysics	
<i>Anomaly detection on galaxy spectra</i>	2016
Galaxy Journal Club, STSCI	

INVITED LECTURER IN ADVANCED SCHOOLS

Teacher in Summer School	2023
Topic: Unsupervised Machine Learning algorithms	
Vatican Observatory Summer School on Data Science and Machine Learning, Castel Gandolfo.	
Panelist in Advanced School	2021
Topic: Applications of unsupervised learning to astronomical datasets.	
SOMACHINE 2021 school, held online.	
Lecturer in Winter School	2018
Topic: Machine learning methods for non-supervised classification and dimensionality reduction techniques.	
Big Data in Astronomy, Winter School of Astrophysics, Canary Islands.	
Lecturer in Winter School	2018
Topic: Machine learning in astronomy.	
AHEAD X-ray and Multi-wavelength school, MPE Garching.	

OBSERVATIONAL EXPERIENCE

1. FIRE on the Magellan telescope (Chile)

From starburst to quiescence: multi-phased gas properties of transitioning galaxies.

I am the PI of this large observing program. The full program, which requires ~ 20 nights on the Magellan 6.5-m telescope in Chile, is planned to obtain rest-frame near-infrared spectroscopic observations of ~ 90 galaxies transitioning from starburst to quiescence. So far, 65 galaxies have been observed during 13 nights.

I was the co-PI (or delegate-PI) and the lead writer of several observing proposals. I was in charge of the object selection, proposal writing and preparation, and calibration and analysis of the observations.

2. MUSE on the Very Large Telescope (Chile)

Mapping AGN-driven outflows in quiescent post starburst E+A galaxies: over 30 hours in total using the WFM, including AO.

Proposals: 100, 102, 105.

3. XMM Newton

X-ray properties of quiescent post starburst galaxies with AGN-driven winds: total of 71 ksec.

Proposals: AO-17.

4. ALMA

AGN-driven molecular outflows in post starburst E+A galaxies: total of 19.5 hours.

Proposals: Cycle 6.

5. NOEMA

Molecular gas content and outflows in post starburst E+A galaxies with massive AGN-driven winds: total of 52 hours.

Proposals: 2019, 2020, 2022.

TEACHING & MENTORING EXPERIENCE

Carnegie-UCR Fellowship host

2023 – present

As part of the ongoing collaboration between Carnegie Observatories and UC Riverside, I have been the host of a Carnegie-UCR graduate student fellow (UCR advisor: prof. Canalizo). The fellowship is for up to two years. The student has been working on estimating the electron density of ionized outflows in active galaxies using KCWI/Keck observations and photoionization modelling.

Mentor of a Princeton PhD student

2023 – present

As part of the ongoing collaborations between Carnegie Observatories and Princeton, I hosted a PhD student from Princeton during the summer months.

Project title: Constraining the most-energetic component of galactic outflows in galaxies in transition using coronal lines.

First paper of the project is in an advanced stage of preparation.

Mentor of a summer research project

2023

Mentored an undergraduate student during the summer as part of the CASSI program (Carnegie Astrophysics Summer Student Internship).

Project title: Unsupervised Machine Learning Representation of Astronomical Lightcurves.

The student is going to present a poster with their results in the upcoming AAS meeting.

Laboratory instructor in undergrad physics laboratories

2018 – 2022

School of Physics, Tel Aviv University

VOLUNTEER EXPERIENCE

1. "Tel Aviv University Astronomy Club"

2015 – 2021

During the time I volunteered in "TAU AstroClub", we hosted tens of events on campus, including lectures on physics and astrophysics at a popular science level, and sky observing events.

2. Working with children from underprivileged backgrounds 2017 – 2020

In collaboration with organizations such as "Pre-Atidim" and "Future female scientists", we hosted hundreds of children at the university for half a day of activities. During these visits, the children heard lectures about different topics in astronomy, and used a telescope to observe the sun or the night sky.

I was the leader of these activities, and was in charge of contacting the organizations and relevant schools, coordinating their visit to the university, coordinating the lectures, and giving some of the lectures.

3. "Astronomy on Tap TLV" 2019 – 2020

4. "Girls Think Science" 2019 – 2020

I gave >10 lectures to young girls about astronomy, and coordinated different activities after the lectures, including observations with a solar telescope, experimentation with an optical table, and drawing galaxies in different bands.

BOOKS

Intelligent Astrophysics 2021

Emergence, Complexity and Computation by Springer.
Editors: Ivan Zelinka, Massimo Brescia, and **Dalya Baron**.

PUBLICATIONS

Lead author: in preparation

1. **D. Baron**, K. M. Sandstrom, E. Rosolowsky, O. V. Egorov, R. S. Klessen, A. K. Leroy, J. Sutter, M. Boquien, E. Schinnerer, J. E. Méndez-Delgado, E. W. Koch, F. Belfiore, E. Emsellem, T. G. Williams, and the PHANGS collaboration "*PHANGS-ML: dissecting multi-phased gas and dust in nearby galaxies using machine learning*", 2023, to be submitted to ApJ within a few weeks.
2. **D. Baron**, H. Netzer, D. Lutz, R. Davies, and J. X. Prochaska, "*Not so windy after all: MUSE disentangles AGN-driven winds from merger-induced flows in rapidly-transitioning galaxies*", 2023, submitted to MNRAS.

Lead author: accepted

1. **D. Baron**, H. Netzer, F. K. Decker, D. Lutz, R. Davies, and J. X. Prochaska, "*Star formation and molecular gas properties of post-starburst galaxies*", 2023, MNRAS, 524, 2, 2741.
2. **D. Baron**, H. Netzer, D. Lutz, J. X. Prochaska, and R. Davies, "*Multi-phase outflows in post starburst E+A galaxies – I. General wind properties and the prevalence of starbursts*", 2022, MNRAS, 509, 4457.
3. **D. Baron** and B. Ménard, "*Extracting the main trend in a dataset: the Sequencer algorithm*", 2021, ApJ, 916, 91B.
4. **D. Baron**, H. Netzer, R. I. Davies, and J. X. Prochaska, "*Multi-phase outflows in post starburst E+A galaxies - II. direct connection between neutral and ionized outflows in SDSS J124754.95-033738.6*", 2020, MNRAS, 494, 5396.

5. **D. Baron** and B. Ménard, “*Black hole mass estimation for Active Galactic Nuclei from a new angle*”, 2019, MNRAS, 487, 3404.
6. **D. Baron** and H. Netzer, “*Discovering AGN-driven winds through their infrared emission - II. Mass outflow rate and energetics*”, 2019, MNRAS, 486, 4290.
7. **D. Baron** and H. Netzer, “*Discovering AGN-driven winds through their infrared emission - I. General method and wind location*”, 2019, MNRAS, 482, 3915.
8. **D. Baron**, H. Netzer, J. X. Prochaska, Z. Cai, S. Cantalupo, D. C. Martin, M. Matuszewski, A. M. Moore, P. Morrissey, and J. D. Neill, “*Direct evidence of AGN-feedback: a post starburst galaxy stripped of its gas by AGN-driven winds*”, 2018, MNRAS, 480, 3993.
9. **D. Baron**, H. Netzer, D. Poznanski, J. X. Prochaska, and N. M. Forster Schreiber, “*Evidence of ongoing AGN-driven feedback in a quiescent post-starburst E+A galaxy*”, 2017, MNRAS, 470, 1687.
10. **D. Baron** and D. Poznanski, “*The weirdest SDSS galaxies: results from an outlier detection algorithm*”, 2017, MNRAS, 465, 4530.
11. **D. Baron**, J. Stern, D. Poznanski, and H. Netzer, “*Evidence That Most Type-1 AGNs are Reddened by Dust in the Host ISM*”, 2016, ApJ, 832, 16.
12. **D. Baron**, D. Poznanski, D. Watson, Y. Yao, N. L. J. Cox, and J. X. Prochaska, “*Using Machine Learning to classify the diffuse interstellar bands*”, 2015, MNRAS, 451, 332.
13. **D. Baron**, D. Poznanski, D. Watson, Y. Yao, and J. X. Prochaska, “*Dusting off the diffuse interstellar bands: DIBs and dust in extragalactic Sloan Digital Sky Survey spectra*”, 2015, MNRAS, 447, 545.

Non-refereed

1. **D. Baron**, “*Machine Learning in Astronomy: a practical overview*”, 2019, A review article published following a winter school in astronomy, arXiv:1904.07248.

Co-author

1. F. Santoro, C. Tadhunter, **D. Baron**, R. Morganti and J. Holt, “*AGN-driven outflows and the AGN feedback efficiency in young radio galaxies*”, 2020, A&A, 644, 38.
2. R. Davies, **D. Baron**, T. Shimizu, H. Netzer, L. Burtscher, P.T. de Zeeuw, R. Genzel, E.K.S. Hicks, M. Koss, M.-Y. Lin, D. Lutz, W. Maciejewski, F. Müller-Sánchez, G. Orban de Xivry, C. Ricci, R. Riffel, R.A. Riffel, D. Rosario, M. Schartmann, A. Schnorr-Müller, J. Shangquan, A. Sternberg, E. Sturm, T. Storchi-Bergmann, L. Tacconi, and S. Veilleux, “*Ionized outflows in local luminous AGN: what are the real densities and outflow rates?*”, 2020, MNRAS, 498, 4150.
3. D. Kim, V. Lekic, B. Ménard, **D. Baron** and M. Taghizadeh-Popp, “*Sequencing Seismograms: A Panoptic View of Scattering in the Core-Mantle Boundary Region*”, 2020, Science, 368, 6496, 1223.
4. J. Wolf, M. Salvato, D. Coffey, A. Merloni, J. Buchner, R. Arcodia, **D. Baron**, F. J. Carrera, J. Comparat, D. P. Schneider, and K. Nandra, “*Exploring the Diversity of Type 1 Active Galactic Nuclei Identified in SDSS-IV/SPIDERS*”, 2020, MNRAS, 492, 3580.

5. T. Shimizu, R. I. Davies, D. Lutz, L. Burtscher, M. Lin, **D. Baron**, R. L. Davies, R. Genzel, E. K. S. Hicks, M. Koss, W. Maciejewski, F. Müller-Sánchez, G. O. de Xivry, S. H. Price, C. Ricci, R. Riffel, R. A. Riffel, D. Rosario, M. Schartmann, and A. Schnorr-Müller, “*The multiphase gas structure and kinematics in the circumnuclear region of NGC 5728*”, 2019, MNRAS, 490, 5860.
6. I. Reis, **D. Baron**, and S. Shahaf, “*Probabilistic Random Forest: A Machine Learning Algorithm for Noisy Data Sets*”, 2019, ApJ, 157, 12.
7. T. Lan, B. Ménard, **D. Baron**, S. Johnson, D. Poznanski, J. X. Prochaska, and J. M. O’Meara, “*On the limitations of statistical absorption studies with the Sloan Digital Sky Surveys I–III*”, 2018, MNRAS, 477, 3520.
8. I. Reis, D. Poznanski, **D. Baron**, G. Zasowski, and S. Shahaf, “*Detecting outliers and learning complex structures with large spectroscopic surveys - a case study with APOGEE stars*”, 2017, MNRAS, 476, 2117.
9. Y. Vadai, D. Poznanski, **D. Baron**, P. Nugent, and D. Schlegel, “*The effect of interstellar absorption on measurements of the baryon acoustic peak in the Lyman α forest*”, 2017, MNRAS, 472, 799.
10. Y. Yao, B. P. Bowen, **D. Baron**, and D. Poznanski, “*SciDB for High-Performance Array-Structured Science Data at NERSC*”, 2015, Computing in Science & Engineering, 17, 3.