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Dalya Baron

Astrophysics Research Student

<https://dalyabaron.com>
<https://github.com/dalya>

- Galaxy formation and evolution
 - Active Galactic Nuclei
 - Machine learning and data science
- Impact:** 23 scientific publications (13 as first author), 1 book, lecturer in 3 advanced schools, and 7 accepted observing proposals

EDUCATION

Ph.D. in Physics, Astrophysics Department, Tel Aviv University	2019 — expected 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

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 Tel Aviv University Astronomy Club, Tel Aviv University	2018

CONFERENCE TALKS

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> - Israel Physical Society online conference	2021
Invited talk: <i>A multi-phased view of outflows in AGN host galaxies</i> - YAGN online conference	2020
Invited talk: <i>Finding simple structures in complex astronomical datasets</i> - ML Tools for Research in Astronomy, Ringberg Castle	2019
<i>Ionized AGN outflows are less powerful than assumed: a multi-wavelength census of outflows in type II AGN</i> - IAUS 356	2019
Invited review talk: <i>Facilitating new discoveries in astronomy with machine learning</i> - AI in Astronomy workshop, ESO	2019
Invited talk: <i>Finding simple structures in complex astronomical datasets</i> - Astronomical time series conference, Heidelberg	2019
Invited talk: <i>Finding simple structures in complex astronomical datasets</i> - Astroinformatics, Heidelberg	2018
Invited talk: <i>Searching for unknown structures and objects in large spectroscopic data sets</i> - Astroinformatics, Cape Town	2017
<i>Anomaly detection on galaxy spectra</i> - Detecting the unexpected conference, STSCI	2017
Invited talk: <i>Transients in the Sloan Digital Sky Survey</i> - Big data in astronomy conference, Tel Aviv	2015

SEMINARS

<i>A multi-phased view of outflows in active galaxies</i> - University of Sheffield, Department of Astrophysics	2020
<i>A multi-wavelength study of outflows in type II AGN</i> - Ben-Gurion University, Department of Astrophysics	2020
<i>A multi-wavelength study of outflows in type II AGN</i> - Hebrew University, Department of Astrophysics	2020
<i>Massive AGN-driven winds in post starburst E+A galaxies</i> - MPE, Garching	2018
<i>Finding simple structures in complex astronomical datasets</i> - MPE, Garching	2018
<i>Automatic detection of structure in large and complex datasets</i> - ETH Zurich, Department of Astrophysics	2017
<i>The sequencer - a novel algorithm for complex structure detection</i> - Johns Hopkins University, Cosmology meeting	2017
<i>Finding the weirdest objects in astronomical surveys</i> - Hebrew University, Department of Astrophysics	2017
<i>The weirdest SDSS galaxies: results from an outlier detection algorithm</i> - Weizmann Institute, Department of Astrophysics	2017
<i>Anomaly detection on galaxy spectra</i> - Galaxy Journal Club, STSCI	2016

INVITED LECTURER IN ADVANCED SCHOOLS

1. Panelist in Advanced School	2021
Topic: Applications of unsupervised learning to astronomical datasets. SOMACHINE 2021 school, held online.	
2. 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.	
3. Lecturer in Winter School	2018
Topic: Machine learning in astronomy. AHEAD X-ray and Multi-wavelength school, MPE Garching.	

TEACHING EXPERIENCE

Laboratory instructor in undergrad physics laboratories, School of Physics, Tel Aviv University

2018 – 2022

OBSERVATIONAL EXPERIENCE

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.

1. 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.

2. XMM Newton

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

Proposals: AO-17.

3. ALMA

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

Proposals: Cycle 6.

4. NOEMA

Molecular gas content in post starburst E+A galaxies with massive AGN-driven winds: total of 40 hours.

Proposals: 2019, 2020.

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

1. **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", 2021, MNRAS submitted (arXiv:2105.08071).
2. **D. Baron** and B. Ménard, "Extracting the main trend in a dataset: the Sequencer algorithm", 2021, ApJ, 916, 91B.
3. **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.
4. **D. Baron**, "Machine Learning in Astronomy: a practical overview", 2019, A review article published following a winter school in astronomy, arXiv:1904.07248.
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.

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. Shangguan, 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.