SHMUEL BIALY

Physics department, Technion- Israel Institute of Technology, Technion city, Haifa 3200002, Israel
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APPOINTMENTS

Faculty - Senior Lecturer (Assistant Prof. equivalent), tenure track 03/2022 –
Physics Department, Technion - Israel Institute of Technology, Haifa, Israel

CTC **Postdoctoral Prize Fellow** 09/2021 – 03/2022
University of Maryland, College Park, MD., USA

ITC **Postdoctoral Prize Fellow** 09/2018 – 08/2021
Harvard-Smithsonian Center for Astrophysics, Cambridge, MA., USA

EDUCATION

Ph.D. in Astronomy: direct Ph.D. program (MA + PhD) 10/2012 – 08/2018
Tel-Aviv University. Advisor: Prof. Amiel Sternberg
Thesis: *Atomic and Molecular Interstellar Gas Processes Across Cosmic Time*

B.Sc. Physics: Magna cum Laude 10/2009 – 10/2012
Tel-Aviv University (TAU)

PRIZES

Alon Scholarship for the Integration of Outstanding Faculty 2023

Postdoctoral Scientist Prize for Excellence, Department of Astronomy, UMD 2022

Marie Skłodowska-Curie Postdoctoral Fellowship (awarded, declined by candidate) 2021
KITP Postdoctoral Prize Fellowship (awarded, declined by candidate) 2021
Oort Postdoctoral Prize Fellowship (awarded, declined by candidate) 2021

Dan David Prize Fellowship 2017

GRANTS

PI: ISF Grant: *The interplay of turbulence, gas cooling and chemistry* + equipment grant 2024-2028
in the dynamic interstellar medium

PI: *"Cold Clouds as Cosmic-Ray Detectors"*, **James Webb Space Telescope** 2024
12.7 observing hours with JWST were awarded (cycle III)

Co-I: NASA ADAP Grant, *"Shaken or stirred: How stellar feedback drives interstellar turbulence?"* (PI: S. Stanimirovic) 2021-2023

PI: *"Using Molecular Clouds as Cosmic-Ray Detectors"*, MMT Observatory 2020
24 observing hours with MMT were awarded

Co-I: NASA SOFIA legacy program, *"HyGAL: characterizing the Galactic interstellar medium with hydrides"* (link). (PIs: D. Neufeld and P. Schilke) 2019-2022

Co-I: French National Research Agency Grant, *The H I-to-H_2 transition in the high redshift Universe"*. (PI: P. Noterdaeme). 2018-2022

cyan text = clickable link

INTERNATIONAL COLLABORATIONS

Member of the science team of the far-UV space telescope *Hyperion*. Since 2021
NASA's medium/small-size explorers (MIDEX) - mission in development.

Member of the science team of the far-IR space telescope *PRIMA*. 2022-2023
(NASA's astrophysics probe) - mission in development.

Co-developer: *the Catalogue for Astrophysical Turbulence Simulations* (link) 2020
A large open-source database of multi-physics hydro simulations (PI: B. Burkhart)

PROFESSIONAL SERVICE

Technion's Astrophysics Seminar Organizer, Technion Since 2023

Panel Reviewer, James Webb Space Telescope 2023-2024

CTC Seminar Series Organizer, UMD 09/2021-03/2023

ITC Seminar and Colloquium Committee, Harvard–CfA 09/2018–09/2020

Co-organizer and Science Committee Member 11/2019
Harvard-Heidelberg Star-Formation Conference

Peer Reviewer Journals: ApJ., MNRAS, A&A

TEACHING

Lecturer. Technion
Course: Intro to Astrophysics and cosmology. Fall semester, 2023

Teaching Assistant, Tel-Aviv University 10/2012–08/2018
Course: Electromagnetism (av. score 94 % + Rector's 100 best TA list)

Lecturer, Tel-Aviv University Science Oriented Youth 10/2014–10/2015
Course: Introduction to Astronomy and Cosmology

PUBLIC OUTREACH

Public Media – Working with Harvard's press office and reporters, producing public articles and movies on the discovery of the Per-Tau Shell ($\sim$ 200M readers worldwide) 10/2021

TAU Astro-Club – Organizing monthly public lectures, guided night-sky observations and open-house events in the Wise observatory. (link) 10/2012–08/2018

A Star is Born – a podcast at the Israeli national radio *Kan*, where I discuss central topics in Astronomy and Cosmology (3 episodes, 40 min. each) (link) 2017

Tel Aviv-Jaffa Social Involvement Program 10/2011–10/2015
Teaching math & physics to schoolchildren of disadvantaged populations at Jaffa.

TALKS (SELECTED TALKS OVER THE LAST 5 YEARS)

Seminars and Colloquia

Ben Gurion University, Israel 06/24
ENS Paris, Paris Observatory 02/24
CAS Seminar, Max Planck Institute for Extraterrestrial Physics, Munich 09/23
Astrophysics Seminar, University of Washington 05/23
Astrophysics Seminar, UNAM, Morelia, Mexico 03/23

Colloquium, University of Maryland, College Park	02/23
Local Universe Group Seminar, STScI	12/22
Astronomy Colloquium, NASA JPL	12/22
Astronomy Tea-Talk, Caltech	12/22
ISM Salon, Flatiron Institute, Center for Computational Astrophysics (CCA), NYC	05/22
CAS Seminar, Max Planck Extraterrestrial Physics, Garching, Germany	06/21
Galaxy Crawl, University of Arizona	04/21
Rutgers University Astrophysics Seminar	01/21
Koenigstuhl Colloquium, Max Planck Institute for Astronomy, Heidelberg	11/20
TAPIR seminar, Caltech	11/20
Astrophysics Seminar, The Technion, Israel Institute of Technology, Haifa	11/20
Astrophysics Seminar, The Weizmann Institute for Science, Rehovot	11/20
Astrophysics Seminar, Hebrew University, Jerusalem	11/20
Astrophysics Seminar, Tel-Aviv University, Tel-Aviv	11/20
Galaxy Evolution Seminar, Center for Computational Astrophysics, NYC	07/20
Galaxy Crawl, University of Arizona	06/20

Conference Talks

"Cosmic rays - the salt of the star formation recipe 3", Florence	10/24
"SuperNova EXplosions Conference (SNEX)", Technion, Israel	08/23
"6th Meeting of the the Interstellar Institute", Paris	06/23
"The Olympian Symposium 2023", Paralia, Greece	05/23
"Cosmic rays - the salt of the star formation recipe II", Florence, Italy	11/22
"A Holistic View of Stellar Feedback and Galaxy Evolution", Ascona, Switzerland	06/22
"Origins Workshop - ISM, Star and Cluster Formation", Salt Lake City + virtual	01/22
"The Grand Cascade: ISM 2021", Institut Pascal, Orsay, France	07/21
"Fundamentals of Gaseaus Halos" KITP workshop	01/21
236$^{\text{th}}$ American Astronomical Society Conference	06/20

SELECTED PUBLICATIONS

- **Bialy, S.**, Zucker, C., Goodman, A., et al. *"The Per-Tau Shell: A Giant Star-Forming Spherical Shell Revealed by 3D Dust Observations"*. ApJ. Letters, 919, L5 (2021) – open access link
- Zucker, C., Goodman, A., Alves, J, **Bialy, S.**, et al. *"Star formation near the Sun is driven by expansion of the Local Bubble"*. Nature (2022) – www.nature.com/articles/s41586-021-04286-5, arXiv:2201.05124
- **Bialy, S.**, *"Cold Clouds as Cosmic-Ray Detectors"*, Nature Communication Physics, 3, 32 (2020) – https://www.nature.com/articles/s42005-020-0293-7
- **Bialy, S.**, Burkhart, B., Sternberg, A. *"The H I-to-H_2 Transition in a Turbulent Medium"*, ApJ., 843, 92 (2017) – arXiv:1703.08549

PUBLICATION LIST (ONLY REFEREED JOURNALS)

- **36** Papers published in refereed journals + **1** accepted for publication, out of which:
- **15** First Author papers
- **2** Single-author papers
- 1463 citations, h-index=20 (G-Scholar; March 2025)

1. **Bialy, S.**, Burkhart, B., Seifried, D., Sternberg, A., Godard, B., Krumholz, M., Walch, S.,

2. Godard, B., des Forets, G. P., **Bialy, S.**, *Shocks in the warm neutral medium. I. Theoretical model* , A&A, 688, A169 (2024) – link *T*he Molecular Cloud Lifecycle I: Constraining H2 formation and dissociation rates with observations , accepted for publication in ApJ. – link

3. Burkhart, B., **Bialy, S.**, Seifried, D., Walch, S., Hamden, E., Haworth, T., Hoadley, K., Kong, S., et al., *T*he Molecular Cloud Life Cycle. II. Formation and Destruction of Molecular Clouds Diagnosed via H2 Fluorescent Emission , ApJ., 975, 269 (2024) – link

4. Park, G., Lee, M.-Y., **Bialy, S.**, Burkhart, B., Dawson, J. R., Heiles, C., Li, D., Murray, C., Nguyen H., Hafner, A., Rybarczyk, D. R. Stanimirovic, S. *"Probing the Conditions for the HI-to-H_2 Transition in the Interstellar Medium"*, ApJ., 955, 145 (2023) – link

5. Foley, M., Goodman, A., Zucker, C.; Forbes, J., Konietzka, R., Swiggum, C., Alves, J., Bally, J., Soler, J., Grosschedl, J., **Bialy, S.**, Grudic, M., Leike, R., Ensslin, T., *"A 3D View of Orion: I. Barnard's Loop"*, ApJ., 947, 2 (2023) – link

6. Sternberg, A., **Bialy, S.**, Gurman A., *"HI in Molecular Clouds: Irradiation by FUV plus Cosmic Rays "*, ApJ., 960, 8S link

7. Kim, W.-J., Schilke, P., Neufeld, D. A., Jacob, A. M., Sanchez-Monge, A., Seifried, D., Godard, B., Menten, K. M., Walch, S., Falgarone, E., Veena, V. S., **Bialy, S.**, Moller, T., Wyrowski, F., *" HyGAL: Characterizing the Galactic ISM with observations of hydrides and other small molecules. II. The absorption line survey with the IRAM 30 m telescope"*, A&A, 670, A111 (2022) – link

8. **Bialy, S.**, Belli, S., Padovani, M., *"Constraining the cosmic-ray ionization rate and their spectrum with MMT observations of dense molecular clouds: a test-bed for JWST"*, A&A Letters, 658, L13 (2022) – link

9. Zucker, C., Goodman, A., Alves, J, **Bialy, S.**, et al. *"Star formation near the Sun is driven by expansion of the Local Bubble"*. Nature, 601, 7893 (2022) – link

10. Gaches, B., Bisbas, T., **Bialy, S.**, *"The impact of cosmic-ray attenuation on the carbon cycle emission in molecular clouds"*. A&A , 658, A151 (2022) – link

11. Padovani, M., **Bialy, S.**, Galli, D., Ivlev A., Grassi T., Scarlett L., Rehill U., Zammit, M., Fursa D., Igor I., *"Cosmic rays in molecular clouds probed by H2 rovibrational lines - Perspectives for the James Webb Space Telescope"*, A&A, 658, A189 (2022) – link

12. Jacob, A., Neufeld, D., Schilke, P., Wiesemeyer, H., Kim, W., **Bialy, S.**, et al., *" HyGAL: Characterizing the Galactic ISM with observations of hydrides and other small molecules – I. Survey description and a first look toward W3(OH), W3 IRS5 and NGC 7538 IRS1"*, ApJ., 930, 141 (2022) – link

13. Syed, J., Soler, J., Beuther, H., Wang, Y., Suri, S., Henshaw, J., Reiner, M., **Bialy, S.**, et al. *"The "Maggie" filament: Physical properties of a giant atomic cloud"*. A&A, 657, A1 (2022) – link

14. Gaches, B., **Bialy, S.**, Bisbas, T., Padovani, P., Seifried, D., Walch, S., *"Cosmic-ray-induced H2 line emission. Astrochemical modeling and implications for JWST observations"*, A&A, 664, 150 (2022) – link

15. Hamden, E., Schiminovich, D., Nikzad, S., Turner, N., Burkhart, B., Haworth, T., Hoadley, K., Kim, S., **Bialy, S.**, et al. *"A far-UV space telescope for high-resolution spectroscopy over wide fields"*, JATIS, 8, 044008 (2022) – link

16. **Bialy, S.**, Zucker, C., Goodman, A., Foley, M., Alves, J., Semenov, V., Benjamin, R., Leike, R., Enßlin, T. *"The Per-Tau Shell: A Giant Star-Forming Spherical Shell Revealed by 3D Dust Observations"*. ApJ. Letters, 919, L5 (2021) – link

17. Zucker, C., Goodman, Alves, J., **Bialy, S.**, Koch, E., Speagle, J., A., Foley, M., Finkbeiner, D., Leike, R., Enßlin, T. *"On the 3D Spatial Topologies of Local Molecular Clouds"*. ApJ 919, 35

(2021) – link

18. Sternberg, A., Gurman, A., **Bialy, S.**, *"HI-to-H_2 Transitions in Dust-Free Interstellar Gas"*.ApJ., 920, 83 (2021) – link

19. **Bialy, S.**, *"The far-UV Interstellar Radiation Field in Galactic Disks: Numerical and Analytic Models"*. ApJ., 903, 62 (2020) – link

20. **Bialy, S.**, *"Cold Clouds as Cosmic-Ray Detectors"*, Nature Communication Physics, 3, 32 (2020) – https://www.nature.com/articles/s42005-020-0293-7

21. **Bialy, S.**, Burkhart, B. *"The Turbulence Driving Scale – Density Decorrelation Scale Relation in a Turbulent Medium"*, ApJ *Letters*, 894, L2 (2020) – arXiv:2001.06023

22. Hu, Y., Lazarian, A., & **Bialy**, S., *"Study Turbulence and Probe Magnetic Fields Using the Gradient Technique: Application to HI-to-H_2 Transition Regions"*. ApJ., 905, 129 (2020) – arXiv:2008.00387

23. Burkhart, B., Appel, S., **Bialy, S.**, et al. *"The Catalogue for Astrophysical Turbulence Simulations (CATS)"*. ApJ., 905, 14 (2020) – arxiv.org/abs/2010.11227

24. **Bialy, S.**, Neufeld, D., Wolfire, M., Sternberg, A., Burkhart, B. *"Chemical Abundances in a Turbulent Medium: H_2, OH^+, H_2O^+, ArH^+"*, ApJ. 885, 109 (2019) – arXiv:1909.12305

25. **Bialy, S.**, Sternberg, A. *"Thermal Phases of the Neutral Atomic Interstellar Medium - from Solar Metallicity to Primordial Gas"*, ApJ., 881, 160 (2019) – arXiv:1902.06764

26. Lingam, M., Ginsburg, I., **Bialy, S.** *"Active Galactic Nuclei: Boon or Bane for Biota?"*, ApJ. 877, 62 (2019) – arXiv:1903.09768

27. **Bialy, S.**, Loeb, A. *"Could Solar Radiation Pressure Explain 'Oumuamua's Peculiar Acceleration?"*, ApJ. Letters, 868, L1 (2018) – arXiv:1810.11490

28. Schruba, A., **Bialy, S.**, Sternberg, A., *"The Metallicity Dependence of the H I Shielding Layers in Nearby Galaxies"*, ApJ., 862, 110 (2018) – arXiv:1805.05353

29. Ranjan, A., Noterdaeme, P., Krogager, J.-K., Petitjean, P., Balashev, S. A., **Bialy, S.**, et al. *" Molecular gas and star formation in an absorption-selected galaxy: Hitting the bull's eye at $z \simeq 2.46$"*, A&A, 618, A184 (2018) – arXiv:1806.07827

30. **Bialy, S.**, Burkhart, B., Sternberg, A. *"The H I-to-H_2 Transition in a Turbulent Medium"*, ApJ., 843, 92 (2017) – arXiv:1703.08549

31. **Bialy, S.**, Bihr, S., Beuther, H., Henning, H., & Sternberg, A., *"H I-to-H_2 Transition Layers in the Star-Forming Region W43"*, ApJ, 835, 126 (2017) – arXiv:1612.02428

32. Bisbas, T. .G., van Dishoeck, E. F., Papadopoulos, P. P., Szucs, L., **Bialy S.**, & Zhang, Z.-Y., *"Cosmic-Ray Induced Destruction of CO in Star-Forming Galaxies"*, ApJ., 839, 90 (2017) – arXiv:1703.08598

33. **Bialy, S.**, & Sternberg, A., *"Analytic H I-to-H_2 Photodissociation Transition Profiles"*, ApJ., 822, 83 (2016) – arXiv:1601.02608

34. Cohen, A., **Bialy, S.**, & Schwartz, M., *"The self consistent expansion applied to the factorial function"*, Physica A: Statistical Mechanics and its Applications, 463, 503 (2016) – http://www.sciencedirect.com/science/article/pii/S0378437116304617

35. **Bialy, S.**, Sternberg, A., Lee, M-Y., Le Petit, F., & Roueff, E., *"H I-to-H_2 Transitions in the Perseus Molecular Cloud"*, ApJ., 809, 122 (2015) – arXiv:1505.06200

36. **Bialy, S.**, Sternberg, A., & Loeb, A., *"Water Formation During the epoch of First Metal Enrichment"*, ApJ. Letters, 804, 29 (2015) – arXiv:1503.03475

37. **Bialy, S.**, & Sternberg, A., *"CO/H_2, C/CO, OH/CO, and OH/O_2 in Dense Interstellar Gas: From High Ionization to Low Metallicity"*, MNRAS, 450, 4424 (2015) – arXiv:1409.6724