

SHMUEL BIALY

Physics department, Technion- Israel Institute of Technology, Haifa, Israel

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APPOINTMENTS

Faculty - Senior Lecturer (Assistant Prof. equivalent), tenure track Physics Department, Technion - Israel Institute of Technology, Haifa, Israel	03/2022 –
CTC Postdoctoral Prize Fellow University of Maryland, College Park, MD., USA	09/2021 – 03/2022
ITC Postdoctoral Prize Fellow Harvard-Smithsonian Center for Astrophysics, Cambridge, MA., USA	09/2018 – 08/2021

EDUCATION

Ph.D. in Astrophysics: direct Ph.D. program (MA + PhD) Tel-Aviv University. Advisor: Prof. Amiel Sternberg Thesis: <i>Atomic and Molecular Interstellar Gas Processes Across Cosmic Time</i>	10/2012 – 08/2018
B.Sc. Physics: Magna cum Laude Tel-Aviv University (TAU)	10/2009 – 10/2012

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

TELESCOPE TIME GRANTED

PI: “ <i>Probing the cosmic ray ionization rate with H₂ rovibrational line emission - the Taurus survey</i> ”, James Webb Space Telescope 48 observing hours awarded (equivalent to \$8M) (program 8961 , cycle 4)	2025
PI: “ <i>Constraining Cosmic Rays with H₂ Ro-Vibrational Excitation in Dense Clouds</i> ”, James Webb Space Telescope 12.8 observing hours awarded (equivalent to \$2M) (program 5064 , cycle 3)	2024
PI: “ <i>Using Molecular Clouds as Cosmic-Ray Detectors</i> ”, MMT Observatory 24 observing hours awarded	2020

GRANTS

PI: ISF Grant + equipment grant: <i>The interplay of turbulence, gas cooling and chemistry in the dynamic interstellar medium</i> (Total: \$320k)	2024-2028
PI: NSF-BSF Grant (Total: \$222k)	2026-2028

PI: GIF Grant: <i>Cold clouds as cosmic ray detectors</i> (Total: \$111k)	2025-2026
Alon Fellowship for the Integration of Outstanding Faculty (Total: \$54k)	2023-2026

PROFESSIONAL SERVICE

Astrophysics Seminar Organizer , Technion's Physics Department	Since 2023
Member, Physics Colloquium Committee , Technion's Physics Department	Since 2024
Grant Reviewer and Advisor , ISERD (Israeli ERC program)	2024
Panel Reviewer , James Webb Space Telescope	2023-2024
Science Team Member , NASA Eos far-UV telescope mission (MIDEX program)	Since 2021
Peer Reviewer: ApJ, MNRAS, A&A	Ongoing

TEACHING

Lecturer , Technion Courses: Introduction to Astrophysics and Cosmology (BA, 3rd year); Physical Processes in the Interstellar Medium (MA level)	Since 2023
Teaching Assistant , Tel-Aviv University Course: Electromagnetism (Rector's 100 best TA list)	2012–2018

STUDENT SUPERVISION

Senior Researcher: Uri Malamud

Grad Students: Amit Chemke, Benjamin Barrington,
Andrey Anisimov, Yedidya Arbel

Undergrad Students: Jonathan Shelest, Dana Bar, Matan Berko

PUBLIC OUTREACH

Public Media Engagement Selected media coverage:	Since 2020
<ul style="list-style-type: none"> • <i>"Invisible Particles That Control Star Birth Measured for First Time"</i> (Technion's Press Release and public media) • <i>"A Massive, Glow-in-the-Dark Cloud Lurking in Our Cosmic Backyard"</i> (New York Times, CNN and others) • <i>"Chemistry in the Turbulent Interstellar Medium"</i> (Harvard's Press Release, and public media) • <i>"Gigantic Cavity in Space Sheds New Light on How Stars Form"</i> (The Independent and others) 	
Technion's Outreach Activities: Giving public talks and organizing telescope observing nights	Since 2023
A Star is Born - Podcast at Israeli national radio <i>Kan</i> , discussing central topics in Astronomy and Cosmology (3 episodes, 40 min. each) (link)	2017

TALKS (SELECTED TALKS OVER THE LAST 5 YEARS)

Seminars and Colloquia

Tel Aviv University	04/26
Bar Ilan University, Israel	07/25
Open University Ra'anana, Israel	06/25
Hebrew University of Jerusalem	05/25
Ben Gurion University, Israel	06/24
ENS Paris, Paris Observatory	02/24
Colloquium, University of Cologne, Germany	2024
CAS Colloquium, 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

Conference Talks

“DAOISM - Unifying Galactic and Extragalactic Views of Star Formation”, Paris (virtual)	04/26
“7th Meeting of the Interstellar Institute (ii7)”, Paris, France	07/25
“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 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	01/22
“The Grand Cascade: ISM 2021”, Institut Pascal, Orsay, France	07/21

PUBLICATION LIST (ONLY REFEREED JOURNALS)

- **44** Total papers in refereed journals (43 published, 1 accepted)
- **1877** citations, h-index=23 (G-Scholar; January 2026)

1. **Bialy, S.**, Chemke, A., Neufeld, D. A., Muzerolle Page, J., Ivlev, A. V., Belli, S., Gaches, B. A. L., Godard, B., Bisbas, T. G., Caselli, P., Jacob, A. M., Padovani, M., Rab, C., Silsbee, K., Porter, T. A., *The first detection of cosmic-ray excited H₂ in interstellar space*, *Nature Astronomy* (2026) – [Link](#)
2. Neufeld, D. A., Silsbee, K., Ivlev, A. V., **Bialy, S.**, Gaches, B. A. L., Padovani, M., Belli, S., Bisbas, T. G., Chemke, A., Godard, B., Muzerolle Page, J., Rab, C., *JWST observations of cosmic-ray-excited H₂ in Barnard 68: spatial variations and constraints on cosmic-ray attenuation*, *ApJ*, 998, 71 (2025) – [Link](#)
3. Gurman, A., Sternberg, A., **Bialy, S.**, Cochrane, R. K., Stern, J., *Molecular Hydrogen in High-redshift Damped Lyman- α Absorbers*, *ApJ*, 995, 116 (2025) – [link](#)

4. Johnson, M., Burkhart, B., D'Eugenio, F., Tacchella, S., Maiolino, R., **Bialy, S.**, Le Bourlot, J., Roueff, E., Le Petit, F., Bron, E., Abgrall, H., Nelson, E., Menon, S., Orr, M. E., *Detecting Molecular Hydrogen (H_2) Emission at Cosmic Dawn*, ApJ., 992, 196 (2025) – [link](#)
5. Burkhart, B., Dharmawardena, T., E., **Bialy, S.**, Haworth, T., Cruz Aguirre, F., Jo, Y.-S., Andersson, B-G, Chung, H., et al., *A Nearby Dark Molecular Cloud in the Local Bubble Revealed via H_2 Fluorescence*, Nature Astronomy, 9, 1064 (2025) – [link](#)
6. Gao, B. A., Zucker, C., Sridharan, T. K., Swiggum, C., **Bialy, S.**, O'Neill, T. J., Peek, J. E. G., Bianchi, L., Benjamin, R., McCallum, L., Goodman, A., Alves, J., Lada, C., Edenhofer, G., Smith, R., Watkins, E., Wood, K., Anderson, D., *Origin of the IRAS Vela Shell: New Insights from 3D Dust Mapping*, ApJ., 987, 73 (2025) – [link](#)
7. **Bialy, S.**, Burkhart, B., Seifried, D., Sternberg, A., Godard, B., Krumholz, M., et al., *The Molecular Cloud Lifecycle I: Constraining H_2 formation and dissociation rates with observations*, ApJ., 982, 24 (2025) – [link](#)
8. Kim, W., Jacob, A., M., Neufeld, D., A., Schilke, P., et al. (incl. **Bialy, S.**) *HyGAL: Characterizing the Galactic ISM with observations of hydrides and other small molecules. III. The absorption lines of [O I], CH, and OH*, ApJ, accepted
9. Burkhart, B., **Bialy, S.**, Seifried, D., Walch, S., Hamden, E., Haworth, T., Hoadley, K., Kong, S., et al., *The Molecular Cloud Life Cycle. II. Formation and Destruction of Molecular Clouds Diagnosed via H_2 Fluorescent Emission*, ApJ., 975, 269 (2024) – [link](#)
10. Godard, B., des Forets, G. P., **Bialy, S.**, *Shocks in the warm neutral medium. I. Theoretical model*, A&A, 688, A169 (2024) – [link](#)
11. Sternberg, A., **Bialy, S.**, Gurman A., *HI in Molecular Clouds: Irradiation by FUV plus Cosmic Rays*, ApJ., 960, 8 (2024) – [link](#)
12. 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](#)
13. 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, 66 (2023) – [link](#)
14. 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 (2023) – [link](#)
15. **Bialy, S.**, Belli, S., Padovani, M., *Constraining the cosmic-ray ionization rate and their spectrum with NIR spectroscopy of dense molecular clouds: a test-bed for JWST*, A&A Letters, 658, L13 (2022) – [link](#)
16. Padovani, M., **Bialy, S.**, Galli, D., Ivlev A., Grassi T., Scarlett L., Rehill U., Zammit, M., Fursa D., Bray I., *Cosmic rays in molecular clouds probed by H_2 rovibrational lines - Perspectives for the James Webb Space Telescope*, A&A, 658, A189 (2022) – [link](#)
17. 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](#)
18. 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, 334 (2022) – [link](#)
19. 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](#)
20. 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](#)
21. Gaches, B., **Bialy, S.**, Bisbas, T., Padovani, M., Seifried, D., Walch, S., *Cosmic-ray-induced H₂ line emission. Astrochemical modeling and implications for JWST observations*, A&A, 664, 150 (2022) – [link](#)
22. Hamden, E., Schiminovich, D., Nikzad, S., Turner, N., Burkhart, B., Haworth, T., Hoadley, K., Kim, S., **Bialy, S.**, et al. *Hyperion: the origin of the stars. A far UV space telescope for high-resolution spectroscopy over wide fields*, JATIS, 8, 044008 (2022) – [arXiv:2212.06869](#)
23. **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](#)
24. Zucker, C., Goodman, A., Alves, J., **Bialy, S.**, Koch, E., Speagle, J., Foley, M., Finkbeiner, D., Leike, R., Enßlin, T. *On the 3D Spatial Topologies of Local Molecular Clouds*, ApJ 919, 35 (2021) – [link](#)
25. Sternberg, A., Gurman, A., **Bialy, S.**, *HI-to-H₂ Transitions in Dust-Free Interstellar Gas*, ApJ., 920, 83 (2021) – [link](#)
26. **Bialy, S.**, *The far-UV Interstellar Radiation Field in Galactic Disks: Numerical and Analytic Models*, ApJ., 903, 62 (2020) – [link](#)
27. **Bialy, S.**, *Cold Clouds as Cosmic-Ray Detectors*, Nature Communication Physics, 3, 32 (2020) – [link](#)
28. **Bialy, S.**, Burkhart, B. *The Turbulence Driving Scale – Density Decorrelation Scale Relation in a Turbulent Medium*, ApJ Letters, 894, L2 (2020) – [link](#)
29. Hu, Y., Lazarian, A., & **Bialy, S.**, *Study Turbulence and Probe Magnetic Fields Using the Gradient Technique: Application to HI-to-H₂ Transition Regions*, ApJ., 905, 129 (2020) – [link](#)
30. Burkhart, B., Appel, S., **Bialy, S.**, et al. *The Catalogue for Astrophysical Turbulence Simulations (CATS)*, ApJ., 905, 14 (2020) – [link](#)
31. **Bialy, S.**, Neufeld, D., Wolfire, M., Sternberg, A., Burkhart, B. *Chemical Abundances in a Turbulent Medium: H₂, OH⁺, H₂O⁺, ArH⁺*, ApJ, 885, 109 (2019) – [link](#)
32. **Bialy, S.**, Sternberg, A. *Thermal Phases of the Neutral Atomic Interstellar Medium - from Solar Metallicity to Primordial Gas*, ApJ., 881, 160 (2019) – [link](#)
33. Lingam, M., Ginsburg, I., **Bialy, S.** *Active Galactic Nuclei: Boon or Bane for Biota?*, ApJ, 877, 62 (2019) – [link](#)
34. **Bialy, S.**, Loeb, A. *Could Solar Radiation Pressure Explain 'Oumuamua's Peculiar Acceleration?*, ApJ Letters, 868, L1 (2018) – [link](#)
35. Schrubba, A., **Bialy, S.**, Sternberg, A., *The Metallicity Dependence of the H I Shielding Layers in Nearby Galaxies*, ApJ., 862, 110 (2018) – [link](#)
36. 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) – [link](#)
37. **Bialy, S.**, Burkhart, B., Sternberg, A. *The H I-to-H₂ Transition in a Turbulent Medium*, ApJ., 843, 92 (2017) – [link](#)

38. 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) – [link](#)
39. **Bialy, S.**, Bihr, S., Beuther, H., Henning, H., & Sternberg, A., *H I-to-H₂ Transition Layers in the Star-Forming Region W43*, ApJ, 835, 126 (2017) – [link](#)
40. **Bialy, S.**, & Sternberg, A., *Analytic H I-to-H₂ Photodissociation Transition Profiles*, ApJ., 822, 83 (2016) – [link](#)
41. 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) – [link](#)
42. **Bialy, S.**, Sternberg, A., Lee, M-Y., Le Petit, F., & Roueff, E., *H I-to-H₂ Transitions in the Perseus Molecular Cloud*, ApJ., 809, 122 (2015) – [link](#)
43. **Bialy, S.**, Sternberg, A., & Loeb, A., *Water Formation During the epoch of First Metal Enrichment*, ApJ Letters, 804, L29 (2015) – [link](#)
44. **Bialy, S.**, & Sternberg, A., *CO/H₂, C/CO, OH/CO, and OH/O₂ in Dense Interstellar Gas: From High Ionization to Low Metallicity*, MNRAS, 450, 4424 (2015) – [link](#)