Melissa DeLucchi

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Overview

I am an industry-trained software engineer and technical lead, developing open source scientific software for large-scale computationally-challenging Astronomy applications.

The nature of my work enables scientific analysis and discovery. Several artifacts here are significant research endeavors where I provided software support, or where software packages I have contributed to were a significant component of the research.

Professional Appointments

Principal Software Engineer Sep 2022 - present

LINCC Frameworks, Carnegie Mellon University, Pittsburgh, PA

Senior Software Engineer Aug 2013 - Sep 2021

Google, Inc, Pittsburgh, PA

Senior Software Engineer Jun 2008 – Jun 2013

Specialized Business Software, Solon, OH

Professional Service

LSST Informatics and Statistics Science Collaboration

Co-Chair Sep 2025 - present

Executive Council Sep 2023 - Sep 2025

Collaboration Meeting Science Organizing Committee April 2024

Selected Publications

Caplar, N., Beebe, W., Branton, D., Campos, S., Connolly, A., **DeLucchi, M.**, Jones, D., Juric, M., Kubica, J., Malanchev, K., (2025). "Using LSDB to enable large-scale catalog distribution, cross-matching, and analytics". In: *arXiv preprint arXiv:2501.02103*.

Caplar, N., **DeLucchi, M.**, Jurić, M., Beebe, W., Branton, D., Campos, S., Jones, D., Malanchev, K., McGuire, S., Lynn, O., Pineau, F.-X., Raen, T., (2025). *HATS: A Standard for the Hierarchical Adaptive Tiling Scheme in the Virtual Observatory*. IVOA Note, Version 1.0. Available at https://www.ivoa.net/documents/Notes/HATS/.

DeLucchi, M., Campos, S., Malanchev, K., McGuire, S., Caplar, N., Juric, M., Kubica, J., West, M., Branton, D., Lynn, O., (2025). "HATS and LSDB: LINCC Frameworks software for analysis of large catalogs". In: *American Astronomical Society Meeting Abstracts*. Vol. 245, pp. 471–02.

Malanchev, K., **DeLucchi, M.**, Caplar, N., Malz, A. I., Alexov, A., Aubourg, E., Bauer, A. E., Beebe, W., Bellm, E. C., Blum, R. D., (2025). "Variability-finding in Rubin Data Preview 1 with LSDB". In: *arXiv preprint arXiv:2506.23955*.

Oldag, D., **DeLucchi, M.**, Beebe, W., Branton, D., Campos, S., Chandler, C. O., Christofferson, C., Connolly, A., Kubica, J., Lynn, O., (2024). "A Python Project Template for Healthy Scientific Software". In: *Research Notes of the AAS* 8.5, p. 141.

Contributing Author of Scientific Articles

Bellm, E. C., Hynes, R. I., Zhao, Y., Gandhi, P., Sandoval, L. R., Campos, S., Caplar, N., **DeLucchi, M.**, Malanchev, K., Wainer, T. M., (2025). "Optical Counterparts to X-ray sources in LSST DP1". In: *arXiv preprint arXiv:2507.14400*.

Palaversa, L., Ivezić, Ž., Caplar, N., Mrakovčić, K., Abel, B., Razim, O., Matković, F., Yablonski, C., Šarić, T., Jurkić, T., Campos, S., **DeLucchi, M.**, Jones, D., Malanchev, K., Malz, A. I., McGuire, S., Jurić, M., (2025). "PhotoD with LSST: Stellar Photometric Distances Out to the Edge of the Galaxy". In: *The Astronomical Journal* 169.3, p. 119. DOI: 10.3847/1538-3881/ada3c2. URL: https://doi.org/10.3847/1538-3881/ada3c2.

Tzanidakis, A., Davenport, J. R., Caplar, N., Bellm, E. C., Beebe, W., Branton, D., Campos, S., Connolly, A. J., **DeLucchi, M.**, Malanchev, K., (2025). "A Systematic Search for Main-sequence Dipper Stars Using the Zwicky Transient Facility". In: *The Astrophysical Journal* 991.1, p. 118.

Merz, G., Liu, X., Schmidt, S., Malz, A. I., Zhang, T., Branton, D., Burke, C. J., **DeLucchi, M.**, Ejjagiri, Y. S., Kubica, J., (2024). "DeepDISC-photoz: Deep Learning-Based Photometric Redshift Estimation for Rubin LSST". In: *arXiv preprint arXiv:2411.18769*.

Schwamb, M. E., Kubica, J., Jurić, M., Oldag, D., West, M., **DeLucchi, M.**, Holman, M. J., (2024). "Controlling Randomization in Astronomy Simulations". In: *Research Notes of the AAS* 8.1, p. 25.

Soto, K. M., Villar, V. A., Berger, E., Gomez, S., Hosseinzadeh, G., Branton, D., Campos, S., **DeLucchi, M.**, Kubica, J., Lynn, O., (2024). "Superphot+: Real-time Fitting and Classification of Supernova Light Curves". In: *The Astrophysical Journal* 974.2, p. 169.

Scientific Software Packages

DeLucchi, M., Campos, S., Malanchev, K., McGuire, S., West, M., Branton, D., Lynn, O., (Sept. 21, 2025a). *HATS - Hierarchical Adaptive Tiling Scheme*. Version 0.6.5. LINCC Frameworks. URL: https://github.com/astronomy-commons/hats.

DeLucchi, M., Campos, S., Malanchev, K., McGuire, S., West, M., Branton, D., Lynn, O., Jones, D., Caplar, N., Schwarz, G., Lucas De Carvalho Silva, L., (Sept. 21, 2025b). *LSDB - python tool for scalable analysis of large catalogs*. Version 0.6.5. LINCC Frameworks. URL: https://github.com/astronomy-commons/lsdb.

Schmidt, S., Gschwend, J., Crenshaw, J. F., Yan, Z., Charles, E., Malz, A., Joudaki, S., Lynn, O. R., Tortorelli, L., Hangqianjun, Joezuntz, Imoskowitz, Kalmbach, B., Jlvdb, Sylvielsstfr, Cohen-Tanugi, J., De Santiago, J., Oldag, D., **DeLucchi, M.**, Sjs86, Doster, V., Lanusse, F., Kelly, H., (May 2023). *LSSTDESC/RAIL: v0.98.5*. Version v0.98.5. DOI: 10.5281/zenodo.7927358.

Talks and Panels

DeLucchi, M. (2025a). "HATS and LSDB: LINCC Frameworks software for analysis of large catalogs". ADASSx 2025. URL: https://pretalx.com/adassx-2025/speaker/VFHERE/.

– (2025b). "LINCC Frameworks July 2025 Hackathon @ RCW: Report". Rubin Community Workshop, Software and Tools for Data Analysis session. URL: https://project.lsst.org/meetings/rubin2025/software-and-tools-data-analysis.

– (2025c). "Variability-finding in Rubin Data Preview 1 with LSDB". Rubin Community Workshop, RFL/DP1 Show and Tell. URL: https://project.lsst.org/meetings/rubin2025/rfldp1-show-and-tell.

Oelkers, R., Mendoza, W., Kubica, J., Metzger, K., Peng, E., Phillipson, B., Mutulu-Pakdil, B., Holt, C., **DeLucchi, M.**, Tucker, D., (2025). "Career Pathways for Students". Rubin Community Workshop. URL: https://project.lsst.org/meetings/rubin2025/career-pathways-students.

DeLucchi, M. (2024a). "An Introduction to LINCC Frameworks". ISSC Collaboration Meeting. URL: https://issc.science.lsst.org/pages/collab_meeting_2024.html.

– (2024b). "Tutorial: LINCC Frameworks Python Project Template". ISSC Collaboration Meeting. URL: https://issc.science.lsst.org/pages/collab_meeting_2024.html.

Co-Authored Posters and Conference Proceedings

Dai, M., **DeLucchi, M.**, Kubica, J., Lynn, O., Malanchev, K., Malz, A., Tauraso, M., (2025). "TDAstro-A LINCC Frameworks Time-Domain Forward-Modeling Package for the Rubin Era". In: *American Astronomical Society Meeting Abstracts*. Vol. 245, pp. 354–02.

Malanchev, K., Beebe, W., Branton, D., Campos, S., Caplar, N., Connolly, A., **DeLucchi, M.**, Juric, M., Kubica, J., Lynn, O., (2025). "Large-scale analysis of light-curve catalogs using LINCC Frameworks' nested-pandas and LSDB". In: *American Astronomical Society Meeting Abstracts*. Vol. 245, pp. 424–08.

McGuire, S., Malanchev, K., Branton, D., Campos, S., Caplar, N., Connolly, A., **DeLucchi, M.**, Juric, M., Kubica, J., Lynn, O., (2025). "Analyzing the geometry of HEALPix tile boundaries to enable scalable processing of large scale catalogs". In: *American Astronomical Society Meeting Abstracts*. Vol. 245, pp. 259–03.

Malanchev, K., Beebe, W., Branton, D., Caplar, N., Connolly, A., Dai, M., **DeLucchi, M.**, Kubica, J., Malz, A., McGuire, S., (2024). "LINCC Frameworks-Time series Analysis & Processing Engine (TAPE) for time-domain survey analysis". In: *American Astronomical Society Meeting Abstracts*. Vol. 243, pp. 261–27.

West, M., Kubica, J., McGuire, S., Wyatt, S., **DeLucchi, M.**, Juric, M., Stetzler, S., Slater, C., Connolly, A., Mandelbaum, R., (2024). "LINCC Frameworks-HiPSCat Margin Caching". In: *American Astronomical Society Meeting Abstracts*. Vol. 243, pp. 261–12.

Wyatt, S., Juric, M., McGuire, S., **DeLucchi, M.**, West, M., Malanchev, K., Slater, C., Stetzler, S., Connolly, A., Mandelbaum, R., (2024). "LINCC-HiPSCat and LSDB: Joint Distributed Analysis of LSST-Scale Datasets". In: *American Astronomical Society Meeting Abstracts*. Vol. 243, pp. 261–09.

Bektesevic, D., Kubica, J., West, M., Christofferson, C., Kalmbach, B., Smotherman, H., Bernardinelli, P., Whidden, P., Branton, D., **DeLucchi, M.,** (2023). "LINCC Frameworks—KBMOD". In: *American Astronomical Society Meeting Abstracts*. Vol. 241, pp. 105–07.

Caplar, N., Kubica, J., West, M., Branton, D., **DeLucchi, M.**, Christofferson, C., Oldag, D., Lynn, O., Malz, A., Chandler, C., (2023). "LINCC Frameworks—Time series". In: *American Astronomical Society Meeting Abstracts*. Vol. 241, pp. 105–05.

Connolly, A., Mandelbaum, R., Kubica, J., Juric, M., Wyatt, S., Caplar, N., Chandler, C., Malz, A., Branton, D., Oldag, D., West, M., Christofferson, C., Newman, J., Wood-Vasey, M., Sokoloski, J., Amvrosiadis, G., **DeLucchi, M.**, Lynn, O., Schafer, C., Lincc Consortium, (Jan. 2023). "The LINCC Frameworks Initiative". In: *American Astronomical Society Meeting Abstracts #241*. Vol. 241. American Astronomical Society Meeting Abstracts, 105.04, p. 105.04.

Wyatt, S., Juric, M., Stetzler, S., Slater, C., Connolly, A., **DeLucchi, M.**, West, M., Mandelbaum, R., Kubica, J., Amvrosiadis, G., (2023). "LINCC—HIPSCat and LSD2: Joint Distributed Analysis of LSST-Scale Datasets". In: *American Astronomical Society Meeting Abstracts*. Vol. 241, pp. 105–06.

Education

Case Western Reserve University, Cleveland, OH May 2008

- Bachelor of Science, Mathematics and Physics
- Bachelor of Arts, Computer Science
- Minor in English, Cinema Studies Concentration

Undergraduate Research Topics:

- Advisor: Corbin Covault, High Energy Astrophysics
- Funded through Support of Undergraduate Research and Creative Endeavours Grant
- X-Ray Occulting Steerable Satellite (XOSS)
  - Developed analytic image partial-reconstruction algorithm using C++.
  - Reconstruction scheme reduced data analysis time and gained a clearer understanding of the original structure.
- Pierre Auger Observatory
  - Implemented a database and web interface for parts management of GPS receivers.
  - Resulted in collaboration-wide access to testing parameters and bench test performance.
- Solar Tower Atmospheric Cherenkov Effect Experiment (STACEE)
  - Developed routines for aggregation and analysis of weather station experimental data.