



WINTER 2024 NEWSLETTER

FEATURED ARTICLES

[SPECIAL WELCOME](#)[NEW ARRIVALS](#)[SPOTLIGHT](#)[PUBLICATIONS](#)[ACHIEVEMENTS AT
A GLANCE](#)[CONGRATULATIONS
2024 GRADS!](#)[UPCOMING EVENTS](#)

MESSAGE FROM THE DIRECTOR

Kevin H. Gardner, Ph.D.

In my opinion, December gets a bad reputation as being the month of hectic scurrying among various professional and personal commitments, ranging from final exams to shopping for holiday presents, all while the days are getting shorter and shorter. From my perspective, I think it's actually a wonderful chance to stop for a moment to appreciate how far we've come in the (almost) twelve preceding months, be thankful for things successfully done, and recharge a bit before tackling the year ahead.

In this vein, 2024 has been an amazing year for SBI. We commemorated our 10th anniversary in September, which included our hosting of Bill Kaelin to talk about the impact of structure-guided drug discovery in renal cell cancer. We've been excited to welcome Francesca Vallese to our fold, as she begins her time as a new assistant professor with us and correspondingly with CCNY Chemistry and Biochemistry. It's been great having her as a new tenure-track faculty member on the floor, bringing exciting new research directions from her training nearby at Columbia. It's also been wonderful to hear very good news on trainees, papers, and grants from two more senior assistant professors, Shana Elbaum-Garfinkle and Daniel Keedy, with their tenure and promotion processes underway. And finally, it's also been a great year on continuing to build on our uniquely strong links with New York Structural Biology Center – arguably one of the best places in the world to do our kind of science, conveniently next door to us and led by top-notch experts like their executive director, Jeff Kieft.

Next year will have its share of big moments ahead, including our second 5-year external review in May and plenty more discoveries made, students trained, and new ideas discussed. Looking forward to doing many of those in time, building off the broad and solid foundation of the current year.

I close by wishing the best of the holiday season and start to 2025 for all of your professional and personal lives.

Kevin



SPECIAL WELCOME



Francesca Vallese, Ph.D.

Francesca Vallese joined ASRC as an Assistant Professor on September 1st. She acquired her PhD at the University of Padova, Italy where her initial postdoctoral research was conducted in the laboratory of Prof. Giuseppe Zanotti, and Francesca gained expertise in purifying membrane proteins and X-ray crystallography.

During her stint as a postdoc, Francesca was a visiting student in Dr. Wolfgang Baumeister Lab at the Max Planck Institute and collaborated with Novartis (Basel) and BioGUNE (Bilbao). And as an Associate Research Scientist at Columbia University in Oliver Clarke's lab, she has become an expert in single-particle cryo-EM.

Prof. Vallese's research is focused on the characterization of membrane protein complexes purified from endogenous sources, including human erythrocytes. The ankyrin complexes, which play a crucial role in maintaining the structural integrity of cells, are her primary interest. Investigating these protein complexes in different cell types provides valuable insights into their critical role in cellular shape and function.

Therefore it is her goal for the Vallese Lab to employ an integrated structural biology approach to explore the functional intricacies of protein assemblies within their natural cellular environment. The Lab will primarily use single particle cryo-electron microscopy, which allows for the visualization of molecular interactions, conformational changes, and dynamic processes within their biological context.

On a personal note, Francesca shared, "Like all Italians. I enjoy good wine and food." But don't tell her you like pineapple pizza, or this former life-guard might let you drown! And in her free time she enjoys hiking, biking, and spending time in nature.

New Arrivals

Akihisa Tsutsumi (Kieft Lab), Visiting Research Scholar

Jean Yalonatos (Soliman Lab), Ph.D. student in Environmental and Planetary Health Sciences

Julia Simon (Gardner Lab), CCNY Undergrad in Biochemistry

Julia Zhang (Keedy Lab), postbacc

Leah Epstein (Gardner Lab), Ph.D. student in Biochemistry

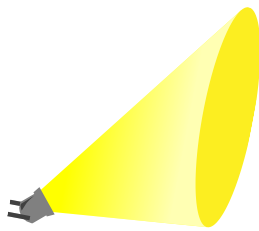
Nadia Ben Slima (Johnson Lab), postbacc

Shahriyor Djuraev (Keedy Lab), CCNY Undergrad in Biochemistry

Tracey Boodoo (Elbaum-Garfinkle Lab), postbacc

Vishal Persuad (Elbaum-Garfinle Lab), Ph.D. student in Biochemistry

SPOTLIGHT ON



DR. PRIYASHA DESHPANDE ELBAUM-GARFINKLE LAB

How long have you been with SBI?

I have been part of the SBI family since 2019!

What was your previous academic and research background?

I obtained my dual Bachelor's and Master's degree (BS-MS) from the Indian Institute of Science Education and Research (IISER) in Mohali, graduating in 2019. My major was Chemistry, with a minor in Biophysics.



For my Master's thesis, I investigated the molecular origins of internal friction in α -synuclein, an intrinsically disordered protein. This protein is of particular interest because it plays a significant role in the development of Parkinson's Disease. Intrinsically disordered proteins lack a fixed three-dimensional structure, which makes them behave differently from typical globular proteins. Internal friction refers to the resistance these proteins experience as they change shape or conformation. Using mutagenesis and time-resolved as well as steady-state fluorescence anisotropy, we identified

What are you working on now?

I am currently pursuing a joint PhD under the supervision of the Elbaum-Garfinkle lab (SBI) and the Casaccia lab (Neuroscience Initiative). My research focuses on understanding the molecular mechanisms that regulate heterochromatin phase separation.

To provide context, the human genome is nearly 2 meters long when fully extended, yet it is remarkably organized within a nucleus that's only micrometers in size. Interestingly, most of our genome doesn't code for proteins! This non-coding DNA, along with its associated proteins, forms a structure called heterochromatin, which plays a crucial role in maintaining the structural integrity of the nucleus. Recent findings suggest phase separation drives the formation and maintenance of genomic compartments, including heterochromatin. Our research investigates how epigenetic marks influence the material properties of phase-separated heterochromatin, using in vitro, computational, and cellular approaches.

What is your favorite thing about NY?

My favorite thing about NYC is its incredible diversity. The city is a melting pot of cultures, cuisines, and ideas from all over the world!

PUBLICATIONS

Daniel Keedy Lab

Atomwise AIMS Program: Wallach I, ..., Keedy DA, ..., Smith KS, ..., Singh N, ..., Hossain S, ..., Dzhumaev S, ..., Azeem SM, ..., Mehlman T, ..., Woods VA..., Heifets A (688 total authors). AI is a viable alternative to high throughput screening: a 318-target study. *Scientific Reports*. 2024. 2;14(1):7526.

Guerrero L*, Ebrahim A*, Riley BT, Kim M, Huang Q, Finke AD, Keedy DA (*contributed equally). Pushed to extremes: distinct effects of high temperature versus pressure on the structure of STEP. *Communications Biology*. 2024. 7(1):59.

Mehlman (Skaist) T, Ginn HM, Keedy DA. An expanded trove of fragment-bound structures for the allosteric enzyme PTP1B from computational reanalysis of large-scale crystallographic data. *Structure*. 2024. 8;32(8):1231-1238.e4.

Sharma S, Mehlman (Skaist) T, Sagabala RS, Boivin B, Keedy DA. High-resolution double vision of the allosteric phosphatase PTP1B. *Acta Cryst F*. 2024. 80(Pt 1):1-12.

Wankowicz SA, Ravikumar A, Sharma S, Riley BT, Raju A, Hogan D, van den Bedem H, Keedy DA, Fraser JS. Automated multiconformer model building for X-ray crystallography and cryo-EM. *eLife*. 2024.



PUBLICATIONS

Daniel Keedy Lab - continued

Woods VA, Abzalimov RR, Keedy DA. Native dynamics and allosteric responses in PTP1B probed by high-resolution HDX-MS. *Protein Science*. 2024. 33(6):e5024.

Ghada Soliman Lab

Rushing, B.R., Thessen, A.E., Soliman, G.A., Ramesh. A., Sumner, S.C. The Exposome and Nutritional Pharmacology and Toxicology: A New Application for Metabolomics. *Exposome*. 2023, 3(1):osad 008.

Shash, E., Soliman, G.A., Al-Kharusi, W., Yahia, M., Mwaiselage, J., Mesemo, D., Mwita, C., Gathere, S., Masamba, L., Rais, H., Hussein, M., Ngo, V., Gelabert, P.M., Hussein, H., Chamberlain, R.M., Soliman, A.S. The Value of Networking in Cancer Education and Capacity Building. *Journal of Cancer Education*, 2023, Dec;38(6):1783-1785.

Soliman, G.A.; He, Y.; Abzalimov, R. Mechanistic Insights into the Metabolic Pathways Using High-Resolution Mass Spectrometry and Predictive Models in Pancreatic β -Cell Lines (β -TC-6). *Biological Life Science Forum* 2023, 29, 16.



PUBLICATIONS



Kevin Gardner Lab

Cleere, M. M.; Gardner, K. H. Optogenetic control of phosphate-responsive genes using single-component fusion proteins in *saccharomyces cerevisiae*. *ACS Synthetic Biology*, 12 Nov. 2024,

Silvestrini ML, Solazzo R, Boral S, Cocco MJ, Closson JD, Masetti M, et al. Gating residues govern ligand unbinding kinetics from the buried cavity in HIF-2 α PAS-B. *Protein Science*. 2024; 33(11):e5198.

Xiao, M.; Dhungel, S.; Azad, R.; Favaro, D. C.; Rajesh, R. P.; Gardner, K. H.; Kikani, C. K. Signal-Regulated Unmasking of Nuclear Localization Motif in the PAS Domain Regulates the Nuclear Translocation of PASK. *Journal of Molecular Biology* 2024, 436 (3), 168433.

Xu, X.; Closson, J. D.; Marcelino, L. P.; Favaro, D. C.; Silvestrini, M. L.; Solazzo, R.; Chong, L. T.; Gardner, K. H. Identification of Small Molecule Ligand Binding Sites On and In the ARNT PAS-B Domain. *Journal of Biological Chemistry* 2024, 107606.



PUBLICATIONS

Shana Elbaum-Garfinkle Lab

Barriaes, D., Kassem, S., Sementa, D., Vidal Ceballos, A., Wang, T., Khandakar, S., Abzalimov, R., Jain, A., Elbaum-Garfinkle, S., Ulijn, R.V. (2023). Localized and regulated peptide pigment formation inside liquid droplets through confined enzymatic oxidation. *Chem. Communications*, 59 (14138-14141).

Deshpande, P., Prentice, E., Vidal Ceballos, A. Casaccia, P., Elbaum-Garfinkle, S. (2024). Epigenetic marks uniquely tune the material properties of HP1 α condensates. *Biophysical Journal*, Apr 24:S0006-3495(24)00282-0.

Green, C.M., Sementa, D., Mathur, D., Melinger, J.S., Deshpande, P., Elbaum-Garfinkle, S., Medintz, I.L., Ulijn, R.V., Díaz, S.A. (2024). Sequestration within peptide coacervates improves the fluorescence intensity, kinetics, and limits of detection of dye-based DNA biosensors. *Communications Chemistry*, 7/1 (49).

Sementa, D., Dave, D., Fisher, R.S., Wang, T., Elbaum-Garfinkle, S., Ulijn, R.V. (2023). Sequence-Tunable Phase Behavior and Intrinsic Fluorescence in Dynamically Interacting Peptides. *Angewandte Chemie*, 135(50), e202311479



ACHIEVEMENTS AT A GLANCE

Anna Geissmann (Elbaum-Garfinkle Lab) received the Doctoral Student Research Grant (DSRG). Presented by the GC in March to attend a Keystone Symposia conference: Biomolecular Condensates: Mechanisms and therapeutic Opportunities.

Liliana Margent Guerrero (Keedy Lab) won the Best Poster Prize at American Crystallographic Association Annual Meeting, Denver, CO in July 2024.

Neha Punia (Elbaum-Garfinkle Lab) was presented the Provost's Pre-Dissertation Science Research Award on May 12th.

Priyasha Despande (Elbaum-Garfinkle Lab) received an ASRC student conference travel award worth \$1,500 earlier this year. (She used the funds to attend the Gordon Research Conference on Intrinsically Disordered Proteins in Switzerland.)

Shivani Sharma (Keedy Lab) was awarded in July 2024 a Travel Award from the American Crystallographic Association Annual Meeting, Denver, CO.



Ghada Soliman was awarded the CUNY Faculty Career Success Fellow 2023-2024 CUNY Office of Transformation. As described in the associated CUNY-SPH press release, this fellowship expands upon and complements an array of impactful faculty professional development programs designed to support the integration of career aspirations and preparation into the classroom. <https://sph.cuny.edu/life-at-sph/news/2023/04/04/soliman-cuny-faculty-career-success-fellowship/>

ACHIEVEMENTS AT A GLANCE



Kevin Gardner in collaboration with Derek Tan (Memorial Sloan Kettering Chemical Biology) has a now funded U54 Project Grant. Entitled, "Structural and Chemical Probing of A New Anticancer Target: HIF-Coactivator Complexes", the project is funded for three years.

Liliana Margent Guerrero and Shivani Sharma (both Keedy Lab) were presented with CUNY GC Doctoral Student Research Grants (DSRG) of \$1,500 and \$1,153 respectively.

James Siclari (Gardner Lab) was also gifted a CUNY GC Doctoral Student Research Grant (DSRG).



Leah Epstein (Gardner Lab) and Vishal Persaud (Elbaum-Garfinkle Lab) was accepted into the CCNY G-RISE Program in July. The Graduate Research Training Initiative for Student Enhancement Program's overarching goal is to strengthen research and professional skills among underrepresented Ph.D. students at CCNY and subsequently ASRC, while also fostering growth and support for the wider community of STEM trainees and mentors.



UPCOMING EVENTS:

ASRC AND CCNY BIOCHEM SEMINAR SERIES WHICH BEGINS ON JANUARY 29TH

LOCATION: ASRC 1ST FLOOR CAFÉ AND AUDITORIUM

TIME: 11:30AM – 1:00PM

GUEST SPEAKER:
RICCARDO MIGGIANO
ASSOCIATE PROFESSOR,
DEPT. OF DRUG CHEMISTRY
UNIVERSITY DEL PIEMONTE
ORIENTALE,
NOVARA, ITALY

CONGRATULATIONS TO OUR 2024 GRADUATES!



Danielle Swingle
Gardner Lab

Danielle completed her PhD student thesis defense entitled, "The alphaproteobacterial general stress response: Investigating protein structure, dynamics, and regulatory mechanisms" on September 27th. And with this recent accomplishment in hand, Danielle went to postdoc in Copenhagen, Denmark in November 2024 with Professor Birthe Kragelund.



Priyasha Deshpande
Elbaum-Garfinkle Lab

Priyasha's defense was entitled, "Biophysical Principles Governing HP1a-DNA Condensate Properties: Regulatory Roles of Histone Tails and RNA." She'll join the Francis Crick institute London and where she'll be working with the mechanobiology and biophysics group

BEST WISHES FOR CONTINUED SUCCESS TO OUR RISING STARS!

