



WHAT'S NEW FOR THE ROCKEFELLER UNIVERSITY SCIENTIFIC RESOURCE CENTERS FY24

The Rockefeller University Scientific Resource Centers continue to support our scientific community with expert staff, cutting edge equipment and services. Scientific Resource Center staff continue to conduct applied research to improve techniques and methodologies and fine tune services to meet researchers' changing needs.

While it's not possible to report here on all the contributions the Scientific Resource Centers make to further and support science and the University's mission, we provide some as examples.

A FEW HIGHLIGHTED CONTRIBUTIONS

Bio-Imaging: The staff started implementing Open Microscopy Environment Remote Objects (OMERO), a modern client-server software platform for visualizing, managing, and annotating scientific image data to ensure better data reproducibility.

Comparative Bioscience Center: The CBC implemented consolidation of mouse colonies as advised by the Academic Council.

Drug Discovery: The University filed two new patents for chemical inhibitors of SARS-COV-2 discovered through projects at the DDRC.

Stratocore/PPMS: Research Support expanded use of and enhanced administrator and user access and billing functions in this LIMS for Bio-Imaging, Cryo-EM, Drug Discovery, Electron Microscopy, Flow Cytometry, Glasswashing and Precision Instrumentation Technologies. We will soon be adding billing information for Genomics and Proteomics. Labs can access and view use and billing information for all the covered Centers through a single logon.

NEW EQUIPMENT & RESOURCES



Bio-Imaging (BIRC): The Nikon Ring TIRF was fully commissioned and is already highly popular. The new custom-built SCAPE (Swept Confocally-Aligned Planar Excitation) system is available in the Beckman Advanced Center for Light-sheet Microscopy (BALM). The SCAPE allows high-speed volumetric imaging of living samples, including moving organisms (currently limited to 20x magnification).

Comparative Bioscience Center (CBC): A new IVIS unit was installed in the *in vitro* biocontainment level 3 facility. A digital pathology slide scanner is available via the Laboratory for Comparative Pathology.

Drug Discovery (DDRC): The DDRC added a new Isothermal Calorimeter and an Integra WellJet. Additions to the library include 50,000 unique new compounds from Life Chemicals, Inc., and 8000 from Enamine.

Electron Microscopy (EMRC): The EMRC added a new Pelco EasiGlow Glow discharge system and Denton Sputter/Carbon Coater.

Genomics (GRC): The GRC traded in the NextSeq500 for a NextSeq2000, added a 10X Chromium X, a QuantStudio3, and the deep DNA sequencer Element AVITI. The AVITI uses a new technology that leverages rolling circle amplification (RCA).

High Performance Computing (HPCRC): HPCRC added 20 L40 and 16 L40S GPUs and added an additional 1PB of storage capacity to DataPark.

Precision Instrumentation Technologies (PIT): The PIT expanded makerspace options with a multiwavelength ULTRA X6000 laser cutter and several 3D printers - Formlabs stereolithography (SLA), Projet 2500 Plus, Dynamism Bambu X1 and Prusa I3.

Proteomics (PRC): A Neo LC system was added to the Fusion Ascend mass spec under a loan program for evaluation. The University, starting in October 2023, contracted with Amy Caudy, Ph.D., a metabolomics expert, to provide consultation and support for PRC staff members and end users of the metabolomics platform.



MAKING AN IMPACT

Acknowledgement of the Scientific Resource Centers ensures that the University meets contractual obligations to funding agencies, strengthens the reputation of the Centers and increases the competitiveness of grant applications that reference use of the Centers. In FY24, University Resource Centers were **acknowledged in 119 publications** by University researchers and Resource Center staff **were co-authors on 67 publications** by University and other institutions' scientists.

Education & Outreach (Examples)

- The heads of all the Centers participated in the **orientation for first year Graduate Students** on October 11, 2023, introducing the new students to the support, services, training, and consultative services available from the Centers.

- The annual **Resource Center Presentation Series**, running from January to June 2024, included talks by all the University Centers and an introduction to the new **Data Science Program**.
- The HPCRC provided data analysis resources for participants of Rockefeller's **Summer Science Research Program (SSRP)** mentored research program for high school juniors and seniors.
- The PIT ran an open house, provided a tour, and assisted with small CAD/3-D printing projects for the **SSRP** and **Summer Neuroscience Program** students.
- The GRC staff hosted the **KL2 Clinical Scholars** for a tour and Q&A on December 4, 2023, and performed and provided support for MiSeq sequencing for the **RockEDU** program.
- Dr. Khajavi from BIRC ran a new learning station on Optics for **Science Saturday** on September 23, 2023.

On & Off Campus Lectures (Examples)

Dr. Pasolli, Director of the EMRC, presented multiple times in multiple settings:

- *“Life at the Electron Microscopy Core: exploring the fascinating world of cells and tissues from mice, ants, mosquitoes and more!”* and *“An electron microscopic journey through the skin: characterization of epidermis and hair follicles in mouse mutants”* during her participation in the **Nicholson Exchange Program** at the Karolinska Institute, September 7-18, 2023.
- *“Lymphatics and The Intestinal Stem Cell Niche: An Ultrastructural and 3D-Immunofluorescence Study.”* Pasolli HA, Niec RE, Scherthanner M, Gur-Cohen S, Fuchs E., at the **Biological Sciences Symposia at the Microscopy and Microanalysis Meeting, Minneapolis, MN**, July 23-28, 2023.
- *“Electron Microscopists Going MAD: Overcoming Challenges in Mice, Ant, and Drosophila Projects.”* Poster presentation with Dr. Sharma. This won the Diatome 2023 Award, 3rd place, at the **Microscopy and Microanalysis Meeting, Minneapolis, MN**, July 23-28, 2023.
- *“Sex and the EM Facility: electron microscopy of mating mosquitoes, Drosophila sperm and more,”* poster presentation at the **VIB Conference “From 3D Light to 3D Electron Microscopy”** (with Dr. Sharma), March 19-22, 2024, Ghent, Belgium.

On September 11, 2023, Dr. Glickman, Director of the DDRC, presented to the Tri-Institutional M.D.-Ph.D. students, providing an **overview of the drug discovery resources** at DDRC and addressing their questions on the topic. The DDRC gave a lab demonstration to the Achelis and Bodman Foundation Board of Directors on December 13, 2023, showing them the fundamentals of the Drug Discovery Operations with respect to automation and compound libraries, explaining examples of successful outcomes.

Classes & Training (Limited Listing)

- **CBC Training Workshops:** The CBC offers a wide range of training events designed to introduce investigators to the facility and to provide them with up-to-date information on technical procedures.
- Resource Center heads and staff served as leads in the “**Introduction to Techniques in Clinical and Translational Science**” certificate course for the University's Certificate in Clinical and Translational Science Program.
- **Image Analysis User Group Meetings** led by Dr. Sharma (BIRC) for University researchers interested in sharing knowledge and learning from each other were held regularly to discuss the latest image analysis methods, pipelines, software, and new relevant publications, e.g., the user group meeting on 3D segmentation using Deep Learning.
- “Beyond the Basics” and “Sample Preparation Overview and Pre-Sort Consultation” **Sessions by the Flow Cytometry Resource Center** (FCRC) are offered regularly and are required for new users.
- The Bioinformatics Resource Center (BRC) led the “**Single cell (sc) RNAseq Analysis**” **bootcamp**, a workshop on Reproducible Analysis, and the “Introduction to Bioinformatics” graduate fellows’ course.
- The HPCRC led a four-day workshop on “**Introduction to UNIX,**” the “**Quantitative Understanding in Biology**” graduate fellows’ course, and participated in the Markus Library’s “Data Visualization in Python” workshop.
- Dr. North, Senior Director of the BIRC, continues to serve in national and international **leadership roles for imaging associations and consortia.**
 - She co-hosted two virtual careers presentations for BioImaging North America (BINA) on April 17th (with Vimal Gangadharan from Zeiss) and May 15th (with Vania Cao from CZI).
 - She co-led the “Optical Microscopy and Imaging in the Biomedical Sciences” course at the Marine Biological Laboratory in Woods Hole, August 14-24, 2023.
 - She presented on BINA’s Corporate Partners Working Group, moderated a session on Core Facility Management training and education, and presented, “Intensive Microscopy Courses in North America” at the LABIxBINA meeting for international (Latin and North American) imaging communities in Morelos, Mexico, September 25-29, 2023.
 - She presented on training and education support from BINA at the Global BioImaging (GBI) Exchange of Experience meeting, held this year at Stellenbosch, South Africa, October 25-27, 2023.

Methodology Publications/Presentations

Participation at RU retreats

- Dr. Pasolli and Dr. Mazel attended the 2023 **Stem Cells, Development & Cancer Retreat** – October. 25 -26, 2023, at Edith Macy Center, Briarcliff Manor. Dr. Pasolli gave a poster presentation (with Dr. Sharma): “Electron Microscopy Resource Center: an Overview”. Dr. Mazel gave a poster presentation: “To sort, or not to sort? That is the question... Sample preparation considerations for single cell solutions” Svetlana Mazel, Stanka Semova, Songyan Han, Samer Shalaby, Yong Chen (Flow Cytometry Resource Center)
- Dr. Pasolli and Dr. Zhao attended the Fifteenth Annual **Anderson Center for Cancer Research Retreat**, April 24-26, 2024, in Tarrytown. Dr. Pasolli gave a poster presentation, “Electron Microscopy Resource Center: How We Can Help!” and Dr. Zhao gave “The Multiomics World of Genomics.”

Others:

- Dr. Mazel participated in an unofficial “**FC-SRL Exchange Program**,” led by Dr. Douagi, Ph.D., Chair of the FC-Section of the Research Technologies Branch, NIAID, on the NIH Bethesda Campus on September 13, 2023.
- Dr. Mazel served on the **external review board of the Flow Cytometry** core at Cold Spring Harbor Laboratory Cancer Center – September 20, 2023, in Laurel Hollow, NY.
- Members of the FCRC staff attended and presented at the **CYTO2024 Meeting “Research Innovation and Discovery”** meeting, May 4-8, 2024, in Edinburgh, Scotland:
 - o Beads and Other Artificial Particles as Controls, “Beauty or the Beast?” by Samer Shalaby, Songyan Han, Stanka Semova, Yong Chen, Svetlana Mazel
 - o Myths About Beads’ Robustness or “What is Going on Behind the Scenes?” by Yong Chen, Samer Shalaby, Songyan Han, Stanka Semova, Svetlana Mazel
- Dr. Pasolli co-authored the Nature article, “*Motion of VAPB molecules reveals ER-mitochondria contact site subdomains. Nature 626, 169–176 (2024)*,” images from which are featured on-line.
- Dr. Sharma from BIRC presented “A comparison of super-resolution microscopy approaches to undertake deep learning-based 3D shape analysis of *Orientia tsutsugamushi* bacteria inside mammalian cells,” at the **Northeast Bioimage Analysis Meeting**, October 20, 2023.
- Dr. North was faculty at the **South African Bioimaging workshop for facility management**, organized by Global Bioimaging, held at the University of Cape Town, South Africa, October 29-31, 2023, and gave the lecture, “**Getting the most out of your microscopes.**”
- The Nature Methods article, “*Community-developed checklists for publishing images and image analyses*,” by an international consortium of experts, including Dr. North and Dr. Sharma, provides guidelines for publishing images and image analyses based on their collective knowledge of best practices. The guidelines were assembled in a two-year project involving dozens of imaging scientists from **Quality Assessment and Reproducibility for Instruments & Images in Light Microscopy**, a group that includes 554 members from 39 countries.

Some RU Technology and Vendor Presentations

The FCRC hosted a Lunch & Learn Seminar with presentation by Mike Blundell from Bio-Rad, entitled, “**Best practice and StarBright Dyes: Easy ways to improve your flow dates and get the right result,**” October 3, 2023.

The BIRC hosted an all day, in-person workshop **Huygens deconvolution and image processing workshop** featuring visiting scientists from Scientific Volume Imaging/Huygens, March 27, 2024. attended by more than 40 people from RU and other NYC institutions.

Grants, Gifts & Awards

The University, with Tim O’Connor as PI, applied for an **NIH C06 grant for funds to expand and enhance the PIT**, including the creation of a microfabrication facility. The grant was well scored but not funded. We are submitting a revised application under the 2025 C06 opportunity.

The DDRC serves as the HTS and biophysics center, led by Dr. Glickman, under the Metropolitan Anti-Viral Drug Accelerator (MAVDA) grant. This grant funded the purchase of several new biophysical instruments, automated pipettors and 100,000 library compounds which will become available for general use in the spring of 2025.

The BRC, in collaboration with the Mucida Laboratory and other external researchers led by the Food Allergy Science Initiative (FASI), received a **NIH P01 grant** for the project "The Role of Neuroimmune Pathways in Food Allergies." The BRC serves as the project’s primary data analysis core.

A generous gift from the **F.M. Kirby Foundation** funded purchase of the Denton Sputter/Carbon Coater and offset cost of the 10X Chromium X.

New equipment for the PIT was funded through a generous gift from the **Evelyn Gruss Lipper Foundation**.

The **Kavli Neural Systems Institute** provided generous support for personnel in the Bioinformatics Resource Center from FY22 through FY24.



Dr. Sharma’s ant larvae image won the **JEOL 2023 Image Contest Award** and was digitally displayed in the JEOL booth during Microscopy and Microanalysis Meeting in Minneapolis, July 23-28, 2023.

Great appreciation for gifts & support from:

- **HHMI**
- **The Arnold & Mabel Beckman Foundation**
- **The Fisher Foundation**
- **The Kavli Neural Systems Institute**
- **The F.M. Kirby Foundation**
- **The Evelyn Gruss Lipper Charitable Foundation**

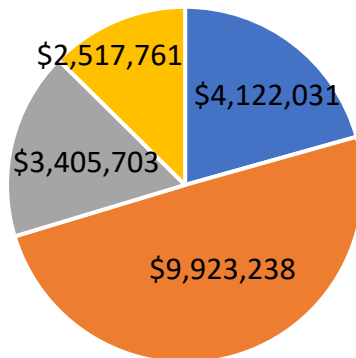
BY THE NUMBERS

Numbers of Labs Using the Resource Centers

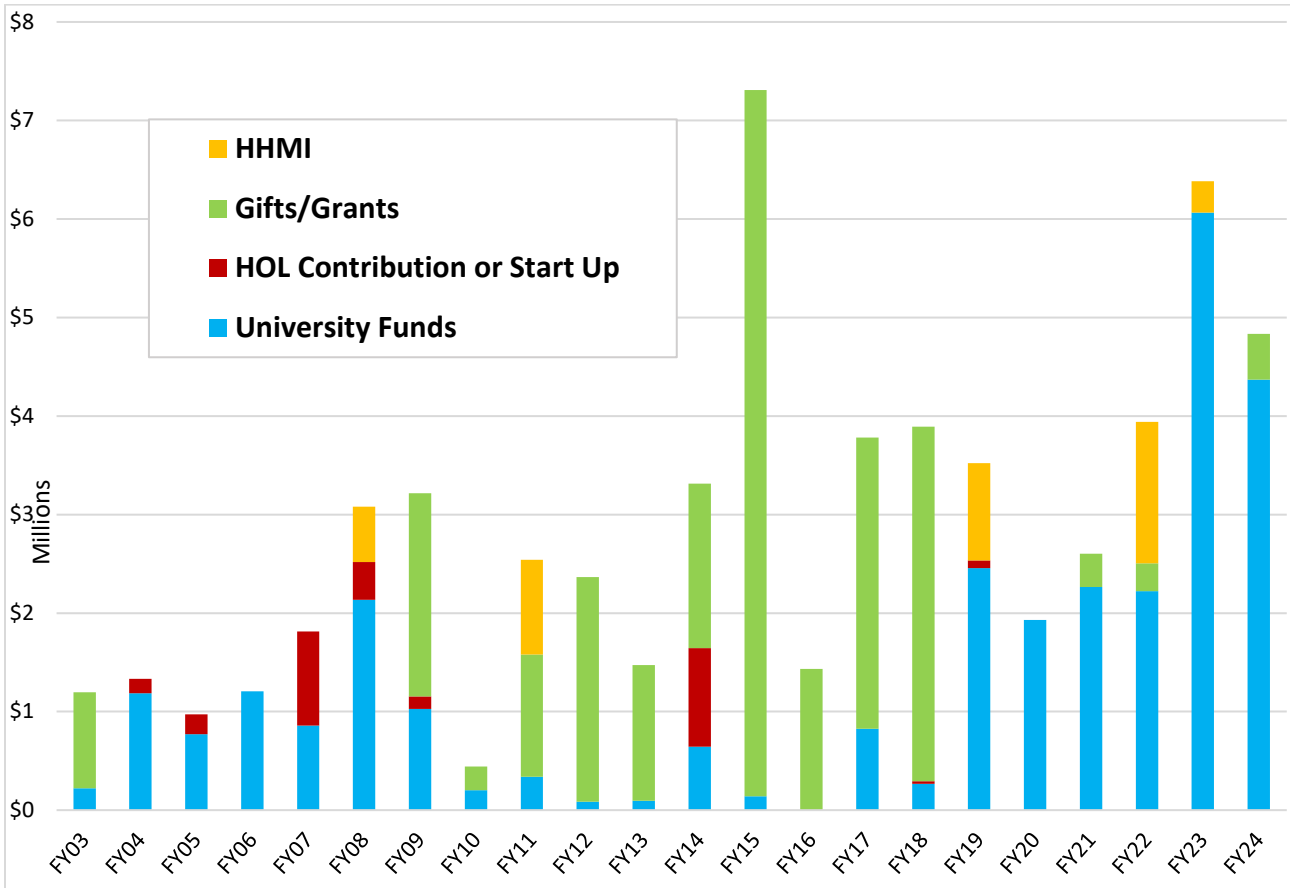
Research Centers	RU Labs	External Labs FY 24
Antibody & Bioresource	5	>100
Bio-Imaging	48	17
Bioinformatics	36	1
Comparative Bioscience Center	46	3
Cryo-EM	16	0
Drug Discovery	33	13
Electron Microscopy	28	9
Flow Cytometry	44	1
Genomics	44	1
CRISPR & Genome Editing	18	4
Glasswashing	63	4
High Performance Computing	44	0
Precision Instrumentation Technologies	40	3
Proteomics	35	19
Reference Genome	2	50
Structural Biology	8	0
Transgenic & Reproductive Technologies	19	2

FY24 RU Labs Spend at Resource Centers by Funding Source

- RU Funds
- Grant Funds
- HHMI funds
- External



Resource Center Capital Equipment FY03 to FY24



Operating Funds for the Resource Centers

Operating funds for the Resource Centers are drawn from the University’s annual operating budget and are offset, to varying levels, by user fees. User fees for Center services and products are set to offset only direct operating costs, e.g., consumables, service contracts and labor. They are not used to offset capital equipment costs.

Center Operating Budgets and Cost Recovery FY21 to FY24

User fees for services and products are established by the University administration, in compliance with NIH requirements, with input from the Centers’ Scientific Advisory Committees, and with review by University Finance.

Resource Center	FY21		FY22		FY23		FY24	
	Operating	Cost Recovery	Operating	Cost Recovery	Operating	Cost Recovery	Operating	Cost Recovery
Antibody & Bioresource	86,133	25,380	0	52,698	94,525	75,460	32,044	28,901
Bio-Imaging	950,096	463,439	954,090	557,937	1,171,641	579,210	1,301,876	627,098
Bioinformatics	692,003	201,331	791,862	244,208	773,347	271,463	819,903	271,571
Comparative Bioscience Center	11,791,150	9,257,085	12,094,265	9,490,635	12,813,651	10,088,504	13,364,024	10,199,994
CRISPR & Genome Editing	907,818	174,679	790,840	142,309	773,403	180,382	946,268	150,000
CryoEM	937,812	279,990	844,208	410,001	1,446,124	484,069	1,500,793	743,511
Drug Discovery	1,329,119	740,580	1,120,774	1,045,729	1,192,741	1,046,224	1,265,622	1,072,805
Electron Microscopy	419,992	100,148	430,391	125,978	570,612	155,528	562,837	136,944
Flow Cytometry	976,219	424,263	1,029,675	522,043	1,012,163	506,546	1,364,867	492,859
Genomics	2,502,574	2,143,202	2,581,490	2,640,886	3,135,119	3,102,460	2,795,221	3,052,609
Glasswashing	482,471	249,989	463,449	257,067	455,374	235,486	464,920	255,621
High Performance Computing	564,128	297,895	541,333	348,442	909,959	343,592	926,816	491,166
Precision Instrument Techs	634,547	120,603	492,215	89,788	503,062	138,997	836,360	151,185
Proteomics	1,315,609	862,865	1,215,801	920,011	1,158,394	938,928	1,211,859	828,888
Reference Genome	1,017,990	589,174	1,276,757	939,931	1,269,396	932,898	1,026,768	977,148
Structural Biology	127,758	22,912	174,496	35,648	145,257	27,477	98,993	18,006
Transgenics & Reproductive Techs	1,010,331	719,646	996,616	612,472	963,653	428,420	996,100	460,500
TOTAL	25,745,750	16,673,181	25,798,262	18,435,783	28,388,421	19,535,644	29,515,271	19,958,806
Subsidy	35%		29%		31%		32%	

NEW HIRES

- Ece Kilic, Research Support Specialist, Proteomics
- Maria Belen Harreguy Alfonso, Research Support Specialist, Bio-Imaging
- Nia Weston, Research Support Aide, Glasswashing
- Griffin Dennis, Instrumentation Engineer, PIT
- Ning Zhang, Research Support Specialist, Genomics

PROMOTIONS

- Priyam Banerjee to Senior Research Support Specialist, BIRC
- Kaitlyn Woodruff to Research Support Assistant II, GRC
- Chloe Larson to Research Support Specialist, DDRC
- Michael Isay-Del Viscio to Research Support Associate II, PRC
- Christopher Peralta to Research Support Assistant II, PRC