



National Institute of
General Medical Sciences



P30 MSR Evaluation
Working Group:

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Evaluation of NIGMS P30 Mature Synchrotron Resources (MSR) Program

P30 MSR Evaluation Working Group

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- Katie Patel, MSPH
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- Troy Zarcone, Ph.D.

P30 MSR Evaluation Report

- **Background on the P30 MSR program**
- **Key questions and findings**
- **Working group recommendations**

P30 Mature Synchrotron Resources (MSR) Program Objective

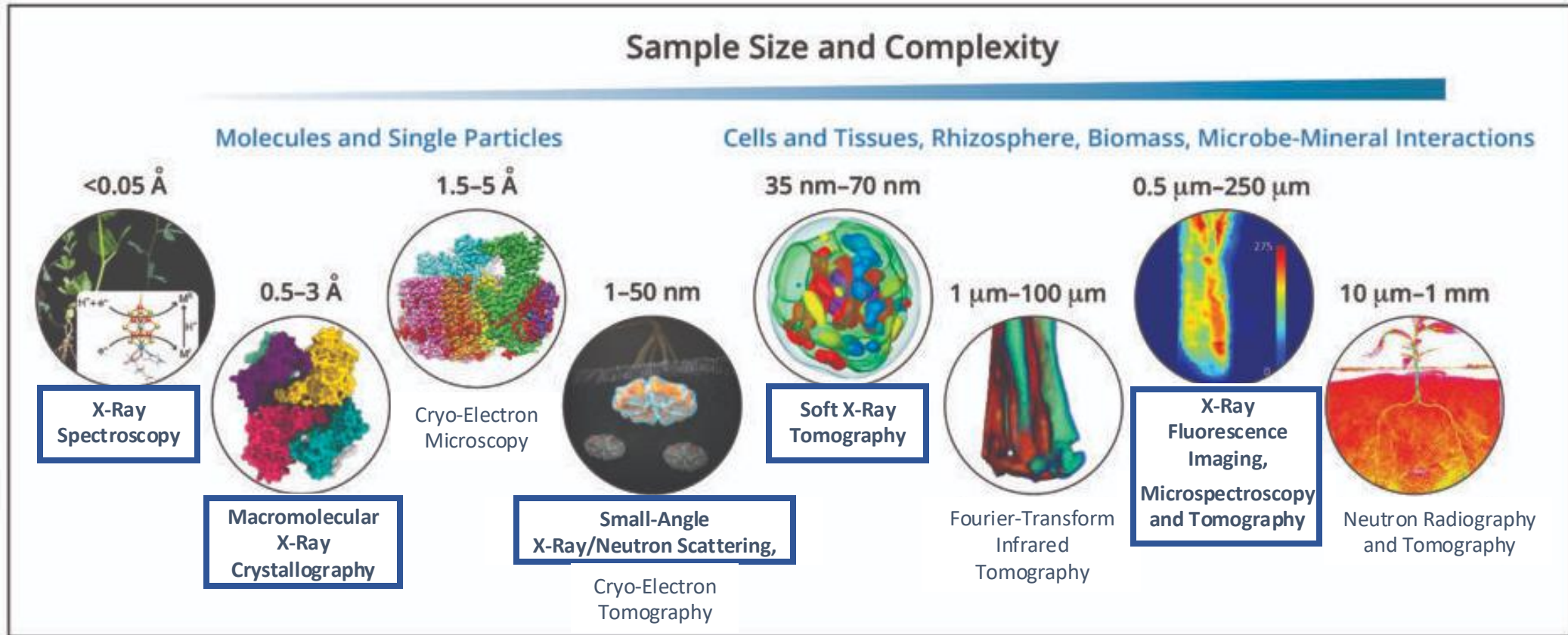
- **Overarching:** Ensure that the biomedical research community has access to state-of-the art synchrotron beamline technologies for biological research applications
 - Maintain or upgrade resources to current best practices
 - Advertise resource capabilities and availability to the biomedical research community through outreach activities
 - Provide user training and support in data collection, processing and analysis

* Language based on [PAR-22-166](#)

MSR Structure

- **Resource Facility**
- **Cores**
 - Administrative
 - User Training and Outreach
 - Technology Operations
- **Intended Resource Users**
 - Biomedical Research Community

Synchrotron Techniques

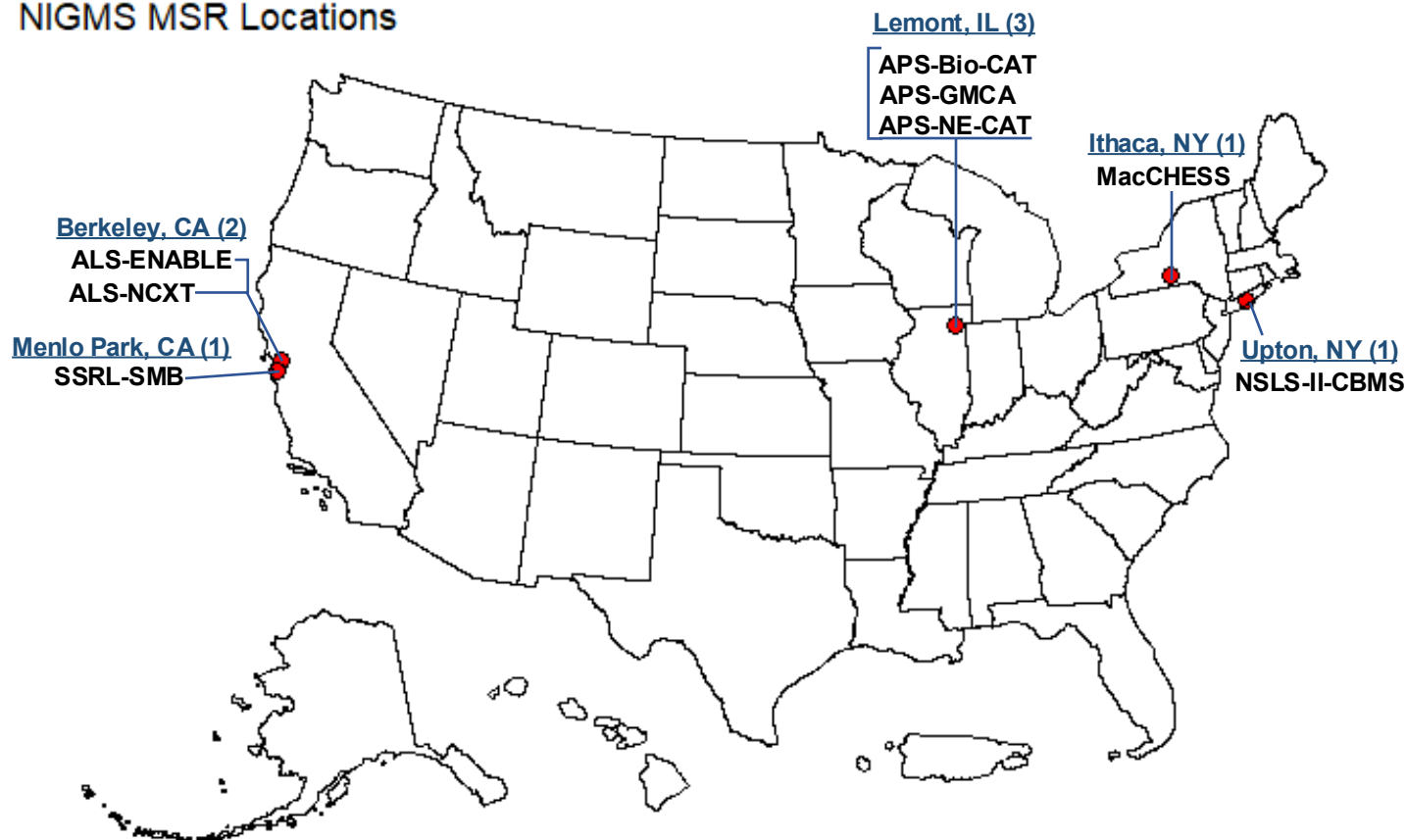


Source: <https://www.berstructuralbioportal.org/techniques-overview/>

 Synchrotron technique available at NIGMS-funded synchrotron resources

NIGMS MSR Sites by Location

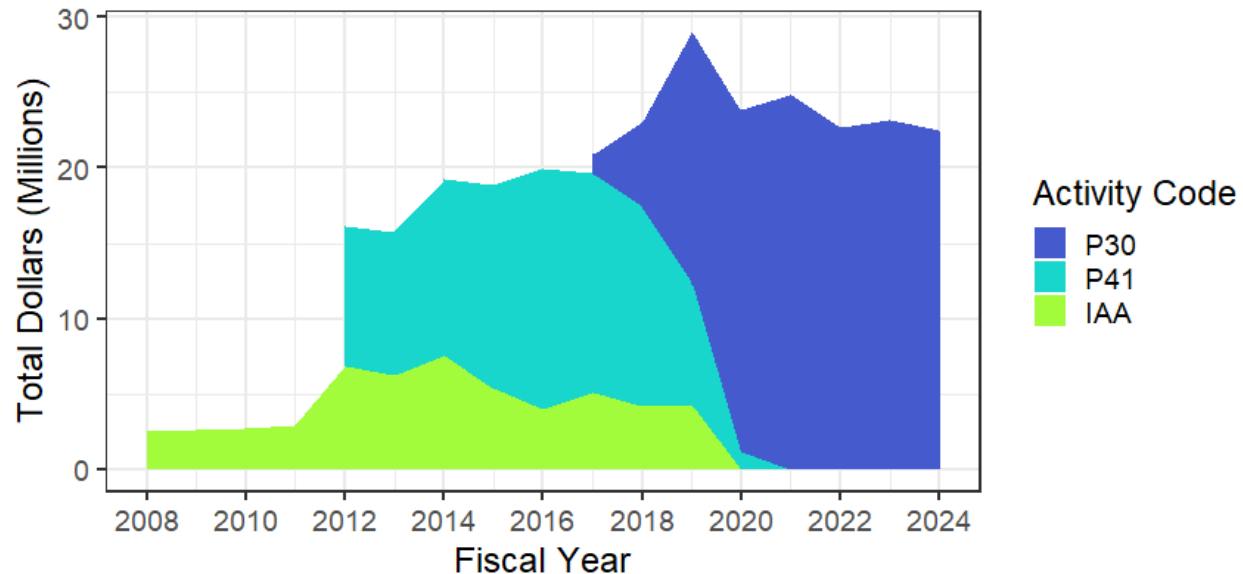
NIGMS MSR Locations



Synchrotron	Resource
Advanced Light Source (ALS)	ALS-ENABLE
Advanced Light Source (ALS)	ALS-NCXT
Stanford Synchrotron Radiation Lightsource (SSRL)	SSRL-SMB
Advanced Photon Source (APS)	APS-GMCA
Advanced Photon Source (APS)	APS-Bio-CAT
Advanced Photon Source (APS)	APS-NE-CAT
Cornell High Energy Synchrotron Source	MacCHESS
National Synchrotron Light Source II	NSLS-II-CBMS

MSR Program Investment

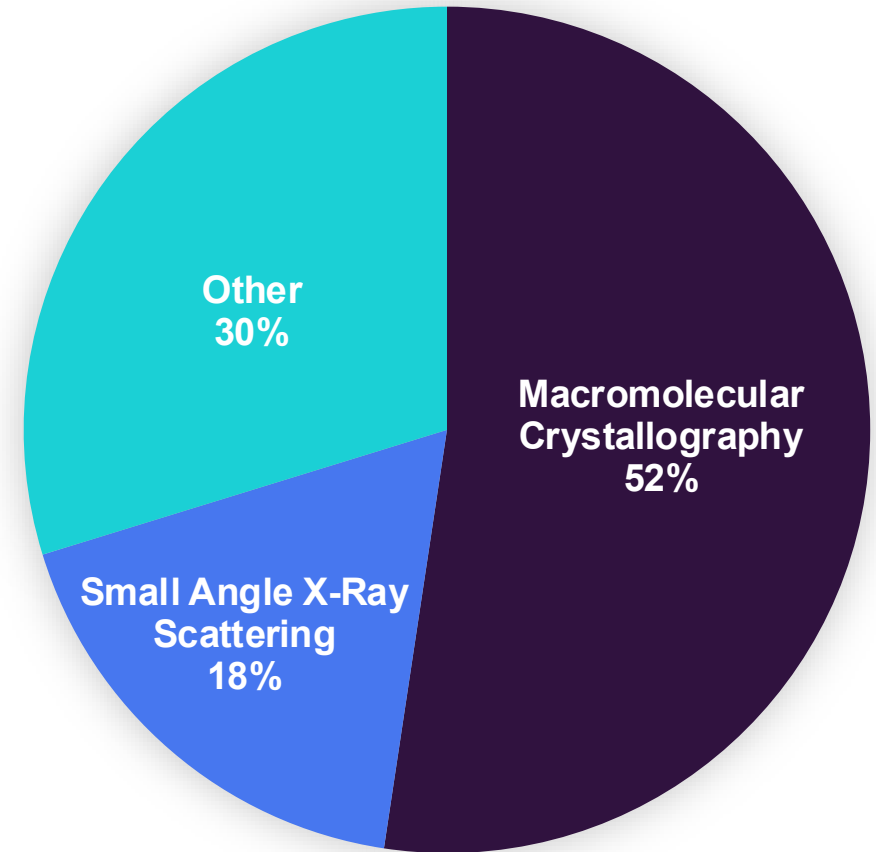
P30, P41, and IAA Synchrotron Resource Award History Dollars By FY



- Prior to FY 2017, the synchrotron resources were funded by NIGMS through the P41 mechanism or Inter-Agency Agreements (IAA)
- After transitioning resources to the MSR program (P30) from 2017-2021, the number of resources has been stable at 8
- Investment in the P30 MSR program has been relatively constant since FY 2020
 - Around \$22 million awarded per year

Beamline and Techniques Overview

- **8 resources, 36 Beamlines (BL)**
 - Many beamlines are partially supported by NIGMS
 - Approximately 21 effective beamlines supported:
 - **MX:** 11 BL
 - **SAXS:** 3.75 BL
 - **Other:** 6.25 BL
- All resources offer remote access, although some techniques may require on-site access
- Time allotted for general users varies with some resources dedicating 100% access to beamlines, while others offer less user time

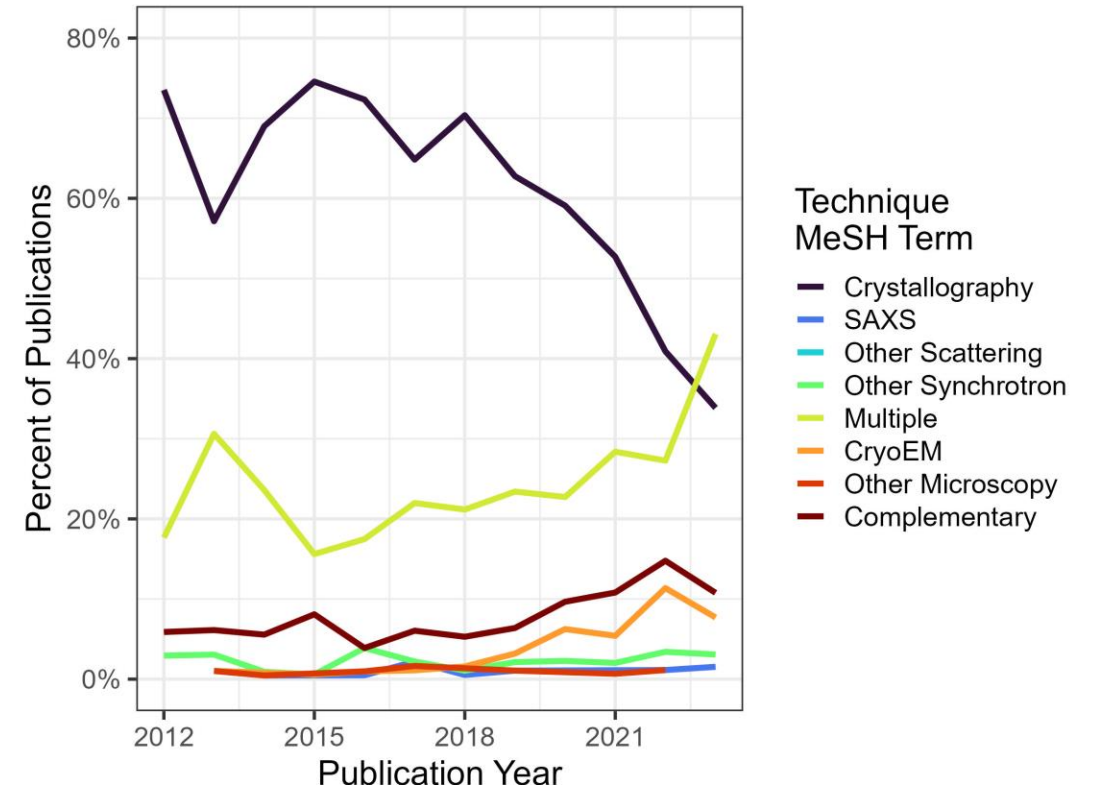


Key Evaluation Questions

- 1. Has the P30 MSR program been effective in meeting its objectives?**
- 2. Are the current objectives of the P30 MSR program appropriate for its intended impacts?**
- 3. Can specific areas of the P30 MSR program be optimized, improved, or strengthened?**
- 4. Are there additional recommendations or key findings that can inform the assessment or improvement of the P30 MSR program?**

MSR Program Has Been Effective In Meeting Its Objectives

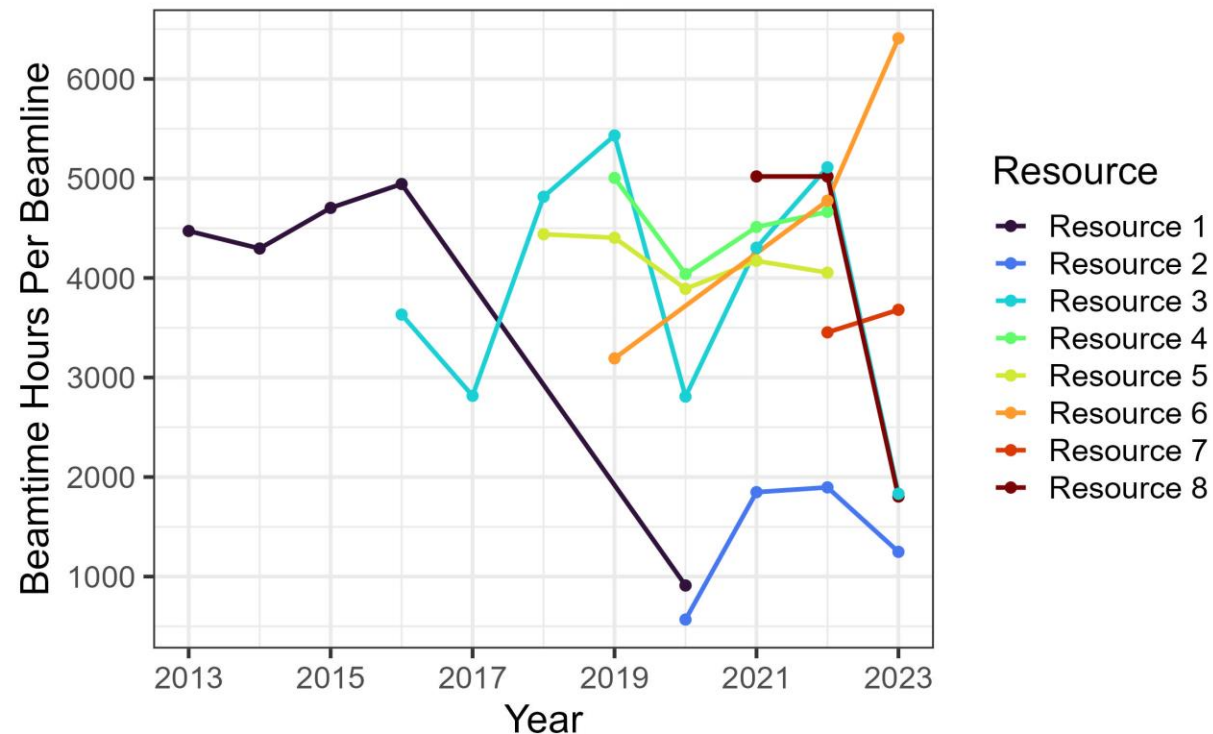
- MSR program supports an important aspect of the diverse ecosystem of structural biology technologies
- In a post-AlphaFold era (2021-), structural biology is needed to improve models and to provide difficult-to-model structures (such as RNA)
- It leverages a large investment across agencies
 - Department of Energy Basic Sciences program provides ~\$500m annually to support storage rings and additional beamlines
 - Department of Energy invested ~\$2b in synchrotron overhauls



Goal 1: Providing access to state-of-the-art synchrotron beamline technologies for biological research applications

Resource Beamtime Hours

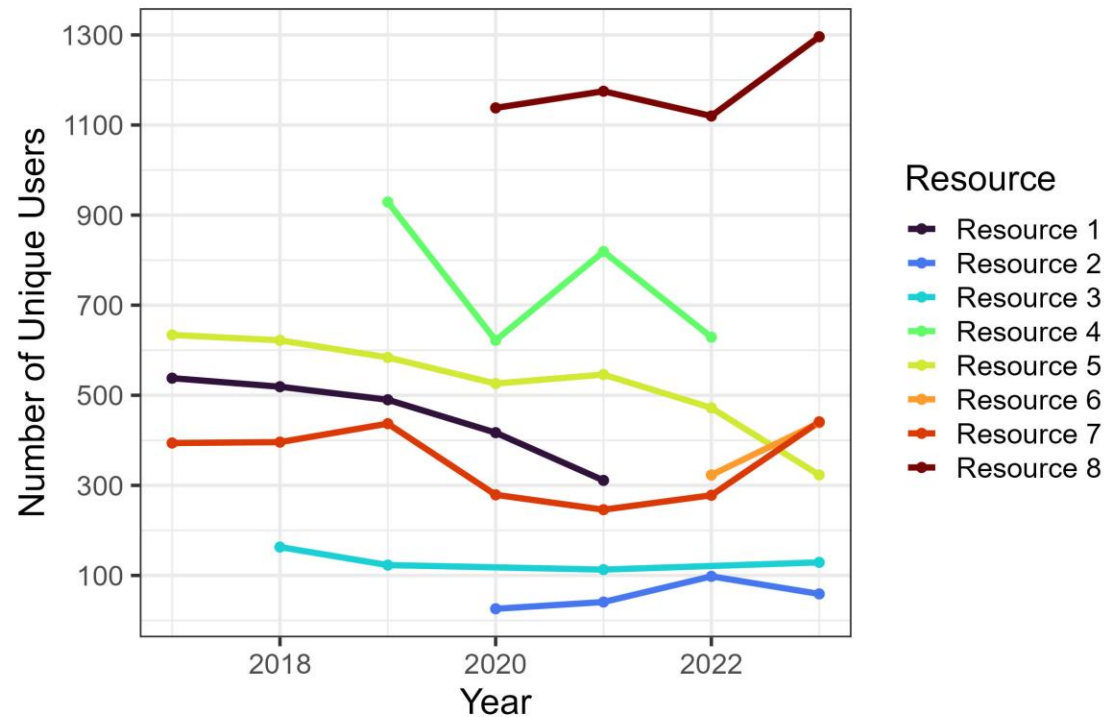
**P30 MSR Number of Averaged
Beamtime Hours Per Beamline
By Year and Resource**



- The amount of available beamtime hours is fairly consistent from year-to-year barring any serious shutdowns (i.e., COVID-19 / Safety / Upgrades)
- For all resources that reported in 2020, there were lower beamtime hours per beamline compared to other years, likely due to COVID-19 shutdowns

Resource Users: Number of Users

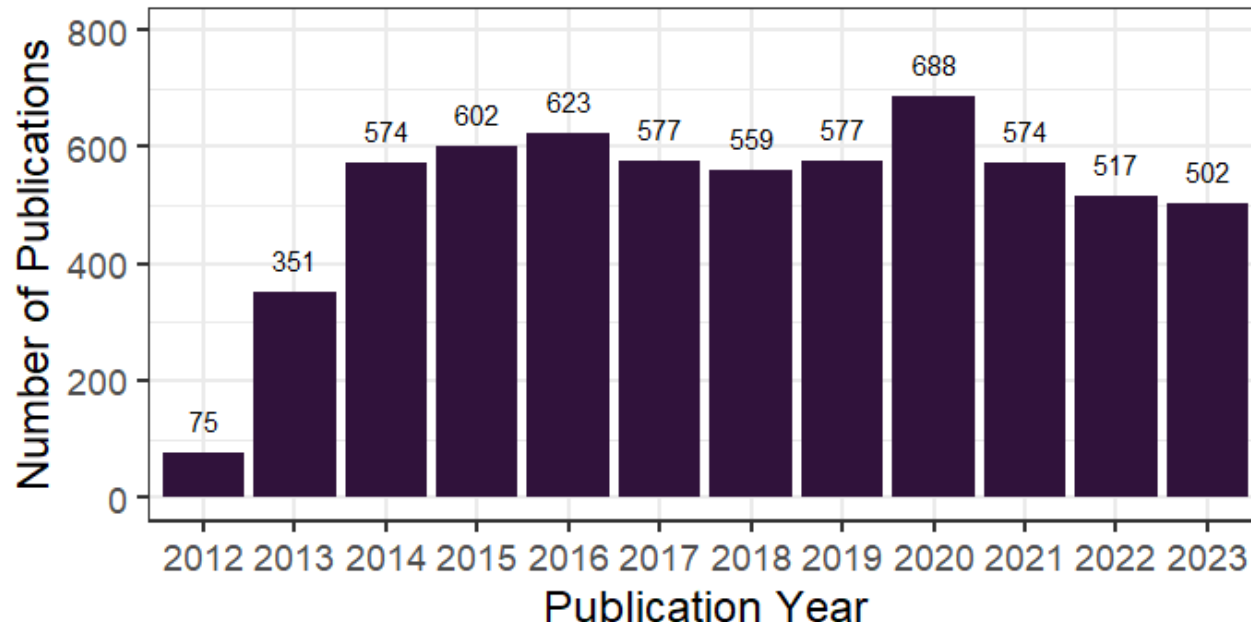
P30 MSR Number of Unique Users
By Year and Resource



- Many resources saw a dip in users in 2020, likely due to COVID-19
- For most resources, the number of users have been consistent or increased
However, a few have seen decreases
 - Downtime may impact users
 - Some resources address planned downtime through agreements with other resources to absorb user requests

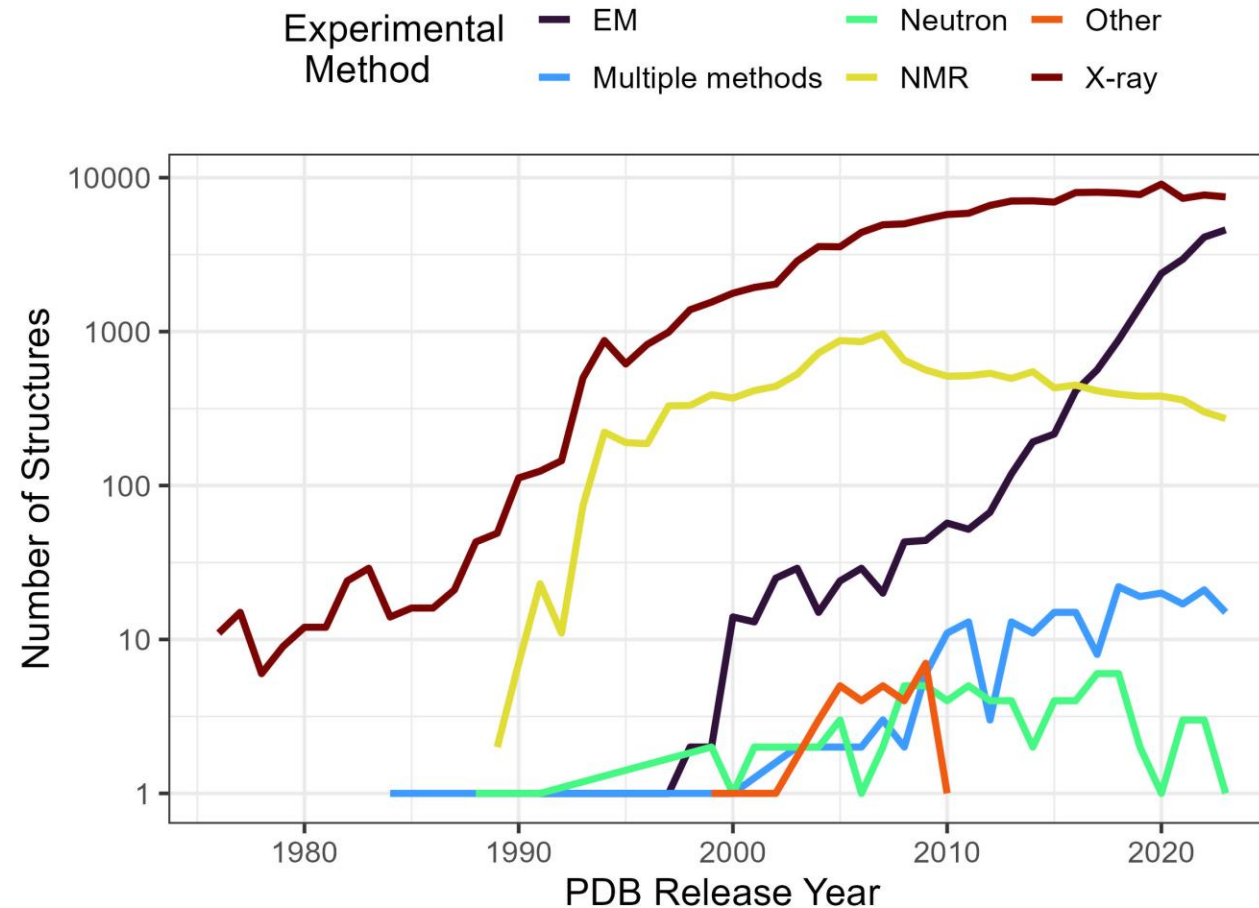
Number of Publications

SPIRES and RPPR Reported Number of Publications By Publication Year



- Includes publications that cite a P30/P41 NIGMS Synchrotron Resource grant as well as publications identified in the RPPR under publications enabled by the resource
- Publications have been relatively constant, with some noteworthy observations:
 - An increase in 2020, likely due to COVID-19
 - Slight decline over the last 3 years (2021-2023), which could be due to reporting lag, COVID-19 impacts, or general decreases

Number of Released PDB Depositions



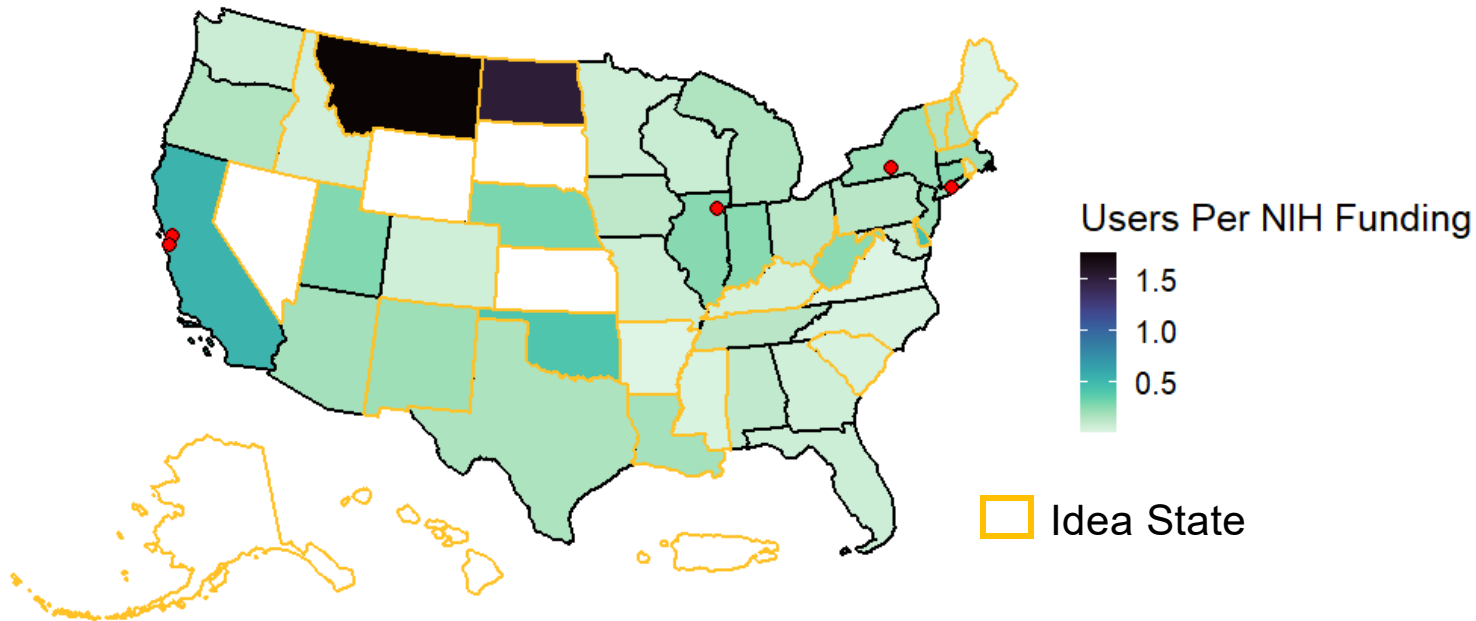
- Depositions associated with most methods have leveled off, except for Electron Microscopy (EM), for which depositions continue to climb

Goals 2 and 3: Advertising resource capabilities and availability through outreach activities, providing user training, and supporting in data collection, processing, and analysis

Resource Users: Outreach is successful

NIGMS MSR Users Per NIH FY 2023 Funding (Millions) by State

2018-2023, IDeA States with Yellow Border



- The MSRs attract users globally, but the majority come from the US
- 90% of States have users accessing the MSRs
- 75% of [IDeA states](#) have users utilizing the MSRs
- These support that outreach is successful

Recommendations

NIGMS Should Encourage Initiatives to Improve User Experience

1. Encourage Beamlines to Standardize:

- a) Application format and process
- b) User interfaces
- c) Training (merit badge system to certify competencies)
- d) Data retention policies and long-term storage needs

2. Fostering consensus approaches through all-MSR meetings

- a) Annual; PIs + key participants
- b) Funded through supplement to host MSR?

Possible Commitment Level for Training

Inspired by Cryo-EM initiative

- **Curriculum Development grants, separate from Centers:**
 - 4 proposals awarded, totaling ~ \$490,000 / year
 - Corresponds to 3% of total funding to Centers
- **In addition to significant training expected within the Cryo-EM National Centers**
- **Curriculum development grants focus on common denominator training needs**

NIGMS Should Provide Reporting Templates

- 1. Future program evaluations would benefit from additional data (application numbers, success rates, wait times for each capability)**
- 2. Goal is to not increase the reporting burden, but simplify the process of reporting and then analysis of data**

Should the P30 MSR Mechanism Support Research?

- 1. Community feedback requested support for beamline technology development research**
- 2. Working group was divided:**
 - a) One perspective: beamline technology development is supported by NIGMS – appropriate that proposals are judged for impact relative to other research
 - b) Other perspective: beamline scientists might be systematically disadvantaged
 - c) NIGMS should consider whether targeted research funding could be included under the P30 mechanism

R01/R21/R35 Technology Development

- R01 / R21 technology development and R35 NIGMS applications were pulled from FY 2017-2024 from MSR organizations or key personnel on MSR P30 awards
- Applications were checked for synchrotron-based technology development
- From FY 2017-2024 there were:
 - R01 Synchrotron Technology Development
 - 14 submitted projects from 4 (50%) MSRs
 - 4 awarded projects to 2 (25%) MSRs
 - R21 Synchrotron Technology Development
 - 5 submitted projects from 2 (25%) MSRs
 - 2 awarded projects to 2 (25%) MSRs
 - R35 Synchrotron Technology Development
 - 3 awarded projects from 2 (25%) MSRs

Outreach and Support Activities Could Be Enhanced

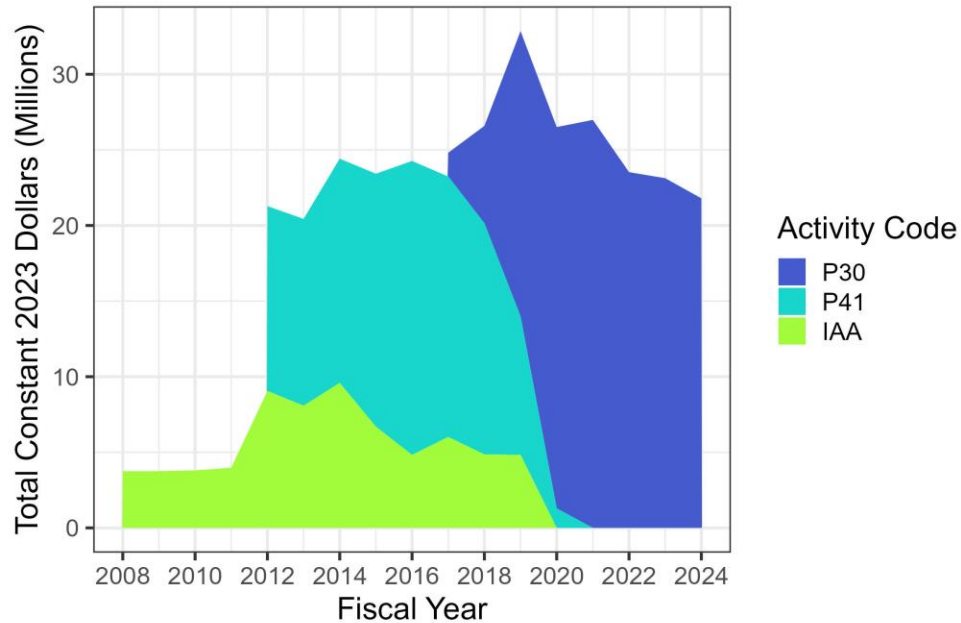
- 1. Beamlines could offer summer internships for undergraduates and graduate students (enhance training and to encourage trainees to enter careers as beamline scientists)**
- 2. Beamlines could consider enhancing available storage and computer processing capabilities (targeted to more resource-limited institutions)**
 - a) Require a funding commitment from NIGMS and could be part of next RFA

NIGMS Should Consider the Level of Beamline Funding

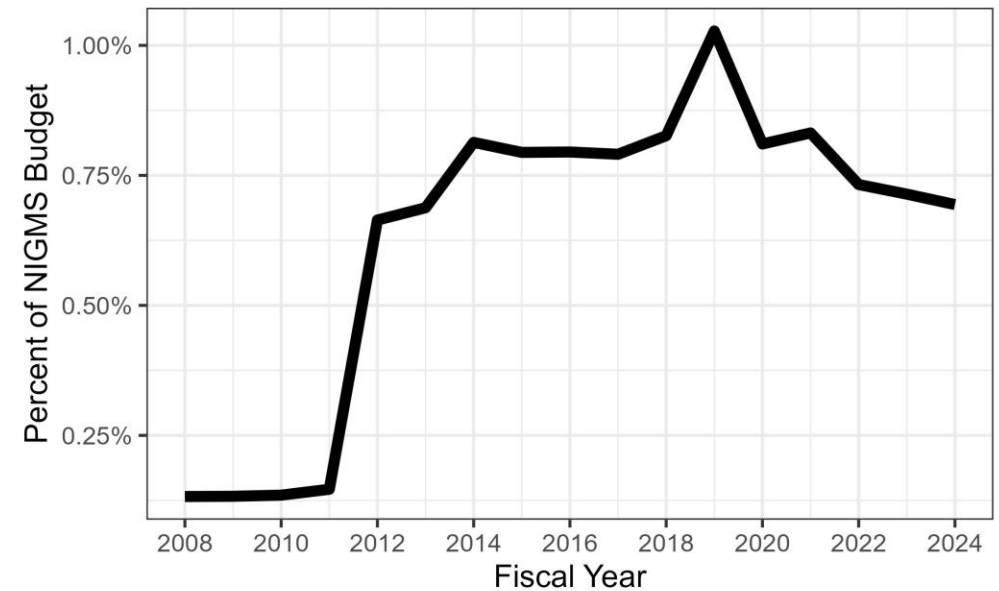
- 1. Community feedback suggested that beamline funding might be inadequate for long-term sustainability**
- 2. NIGMS should weigh the importance of maintaining beamline support and its impact against other programs**

MSR Program Investment in Constant 2023 Dollars

P30, P41, and IAA Synchrotron Resource
Award History Constant 2023 Dollars By FY



P30, P41, and IAA Synchrotron Resource
Award History Dollars
as a Percent of the NIGMS Budget By FY



- The P30 Mature Synchrotron Resource program has been approximately 0.75% of the NIGMS budget since 2014
- This represents a substantial investment by NIGMS