

# Center for High Technology Materials

**Francesca Cavallo\***

Director

Fiscal Year 2024-2025 Annual Review of Category 3 Research Centers/Institutes | Revision Date

*\*Francesca Cavallo began her appointment as Director of the Center for High Technology Materials on Novemeber 1, 2025. The Center for High Technology Materials was under the leadership of interim director Payman Zarkesh-Ha during FY 2024-2025*

# Mission

The mission of CHTM is to create and sustain a culture of excellence to promote research and education in photonics, microelectronics, quantum technologies, and nanoscale materials and devices and their applications; foster interaction between UNM, federal laboratories, industry; and promote an entrepreneurial spirit for economic development with a regional focus but of global importance.

CHTM is committed to workforce development of the next generation of scientists, engineers, discoverers and entrepreneurs who can combine their technical training and critical thinking with excellent interpersonal and communication skills to become leaders of the 21st century.

## Our core strengths are:

Research, creativity, and innovation,

Interdisciplinary education, workforce development, and outreach,

Entrepreneurship and economic development.

We will continue to invent and discover disruptive technologies that can be scaled to develop innovative advanced manufacturing initiatives to create self-sustaining wealth-based economies to ***leave the earth*** a better place than we found it.

# FY 2024-2025 Goals and Status

- Continue to be a pillar for transformative interdisciplinary research and education in photonics, microelectronics, quantum technologies, and nanoscale materials and devices at UNM (100%)
- Maintain a robust dissemination record (100%)
- Acquire and install two e-beam writing and imaging systems (100%)
- Complete Phase I for the quantum materials and technology laboratories (98%)
- Complete a transformers and lighting replacement project (100%)
- Hire, onboard, and integrate 2 PhD-level staff members to support faculty research and the operation of the shared facilities (100%)
- Install a metal 3D printer (20%)
- Maintain a balanced budget aligned with CHTM mission (100%)
- Install and implement FOM (Facility Online Manager) for scheduling and tracking the usage of the shared facilities (100%)

# Membership of Advisory Committee

- Membership List

*The task of reconstituting the CHTM's Advisory Committee was initially put forth in FY24-FY25 and was then tabled in view of an upcoming transition to a new leadership for the Center.*

- No annual review was held

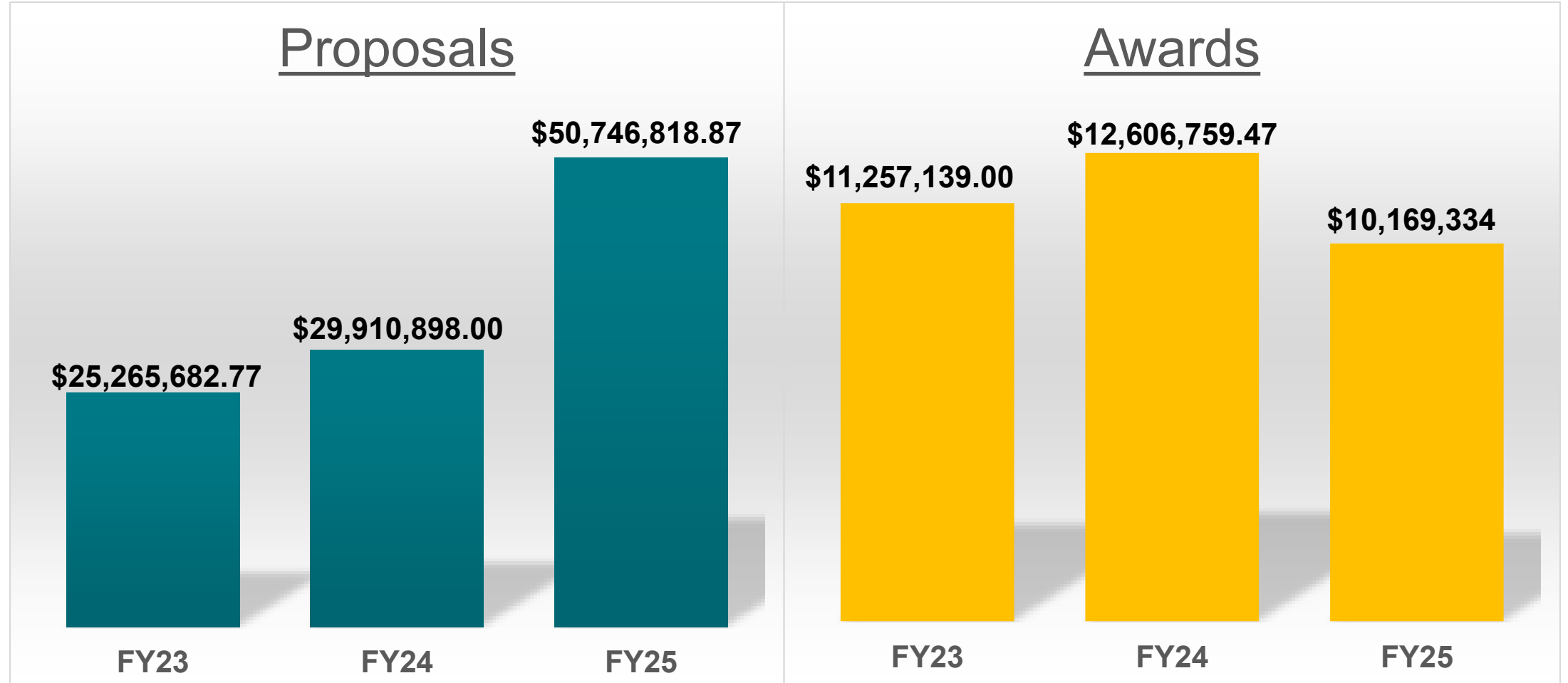
# FY 2024-2025 Highlights

## Major awards

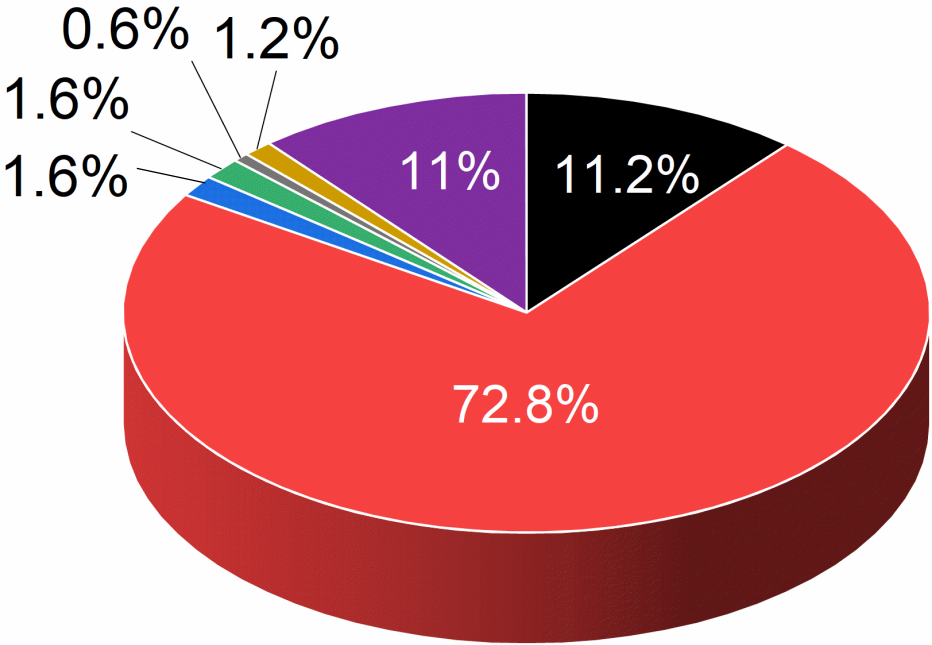
- NSF CAREER Award: N. Jackson, “A Universal Microsystem-based Vibration Energy Harvester.” \$ 500,000
- NSF CAREER Award: T. Drake, “Ultralow phase noise signal generation using Kerr-microresonator optical frequency comb” \$ 558,000
- Victor Acosta, named a 2024 Experimental Physics Investigator by the Gordon and Betty Moore Foundation, \$ 1,250,000.00 research award
- NSF MRI Track 2: Acquisition of an Electron Beam Lithography and Imaging System for Research, Education, and Training, \$ 1,944,433.00
- NRT-QL: Quantum Photonics interdisciplinary training to Advance Quantum Technologies (QPAQT), \$ 2,999,976.00
- NQVL:QSTD:Pilot: Quantum Computing Applications of Photonics (QCAP), \$ 1,000,000.

18 new patents issued bringing the total number of CHTM patents to 286

# Proposals and Awards



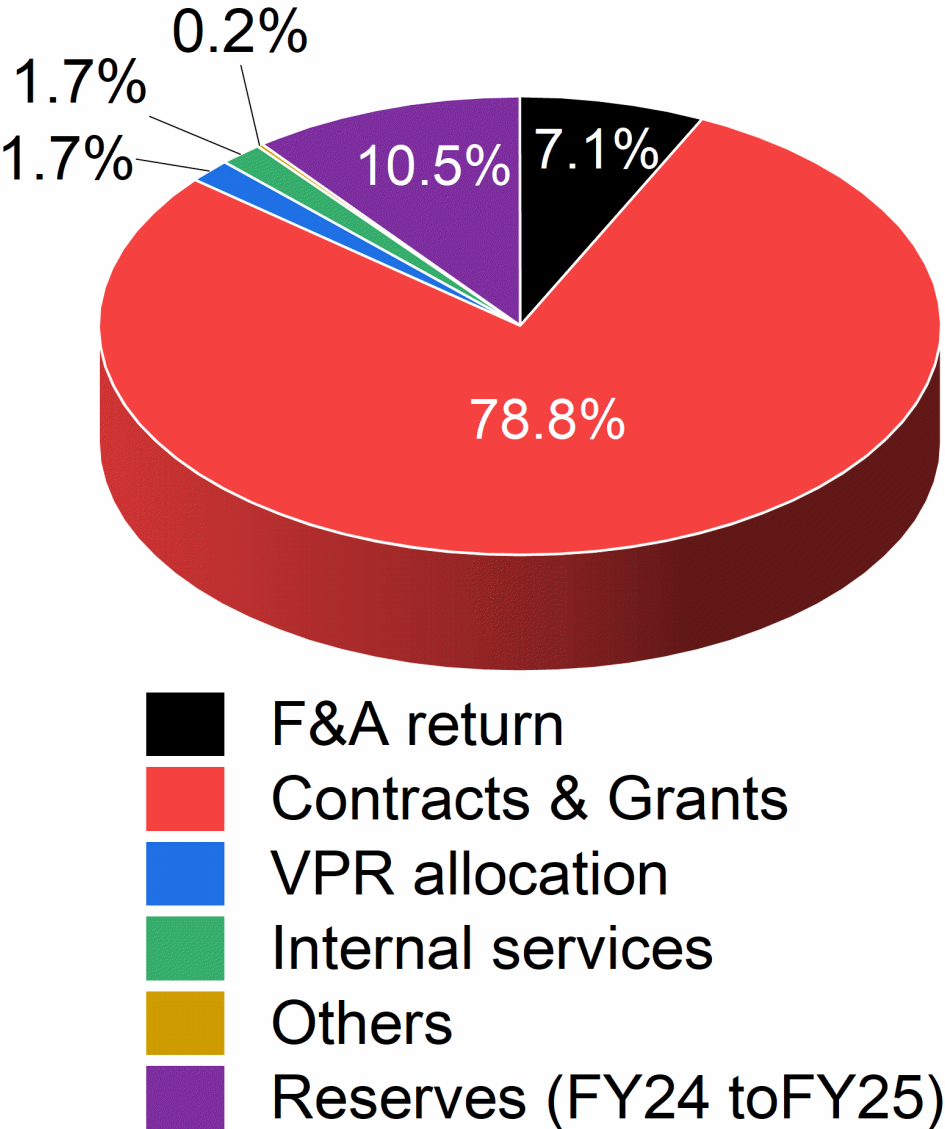
FY 2024 total revenue: \$12,695,726.73



- F&A return
- Contracts & Grants
- VPR allocation
- Internal services
- Transfers and allocation
- Others
- Reserves (FY23 to FY24)

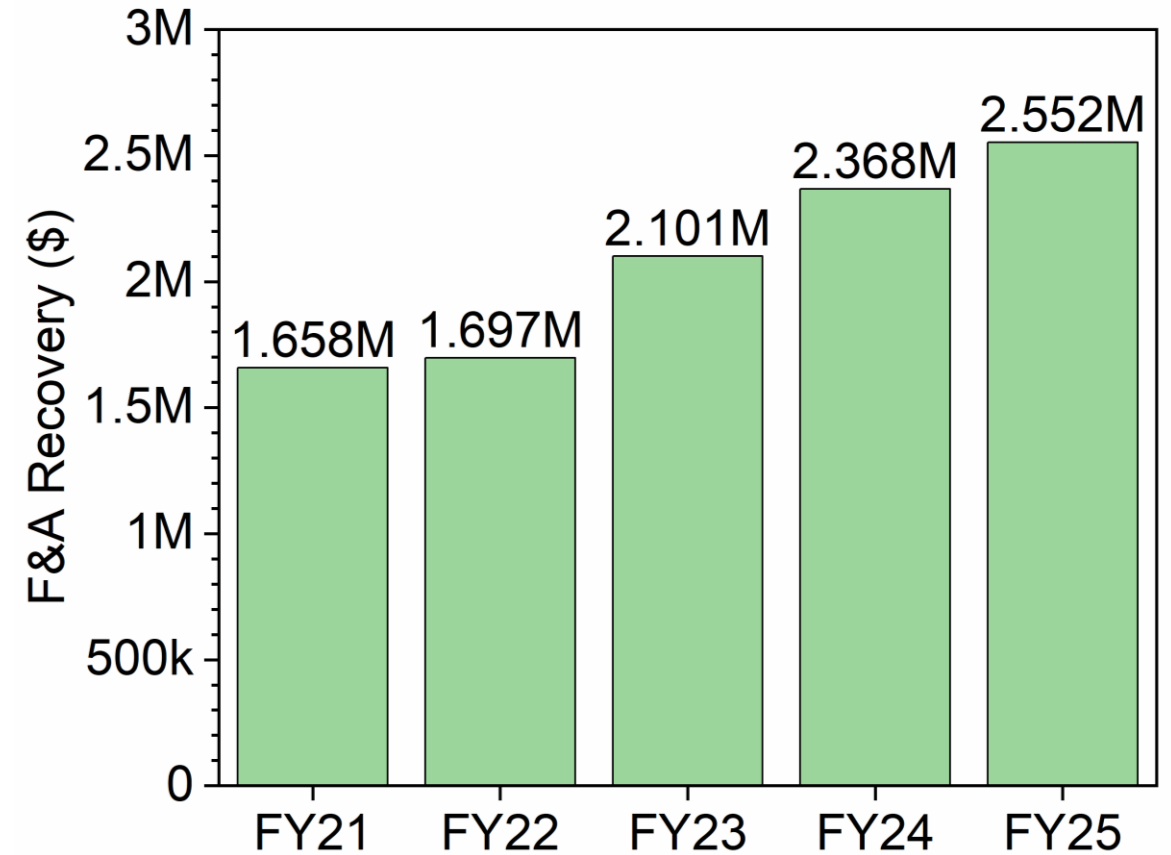
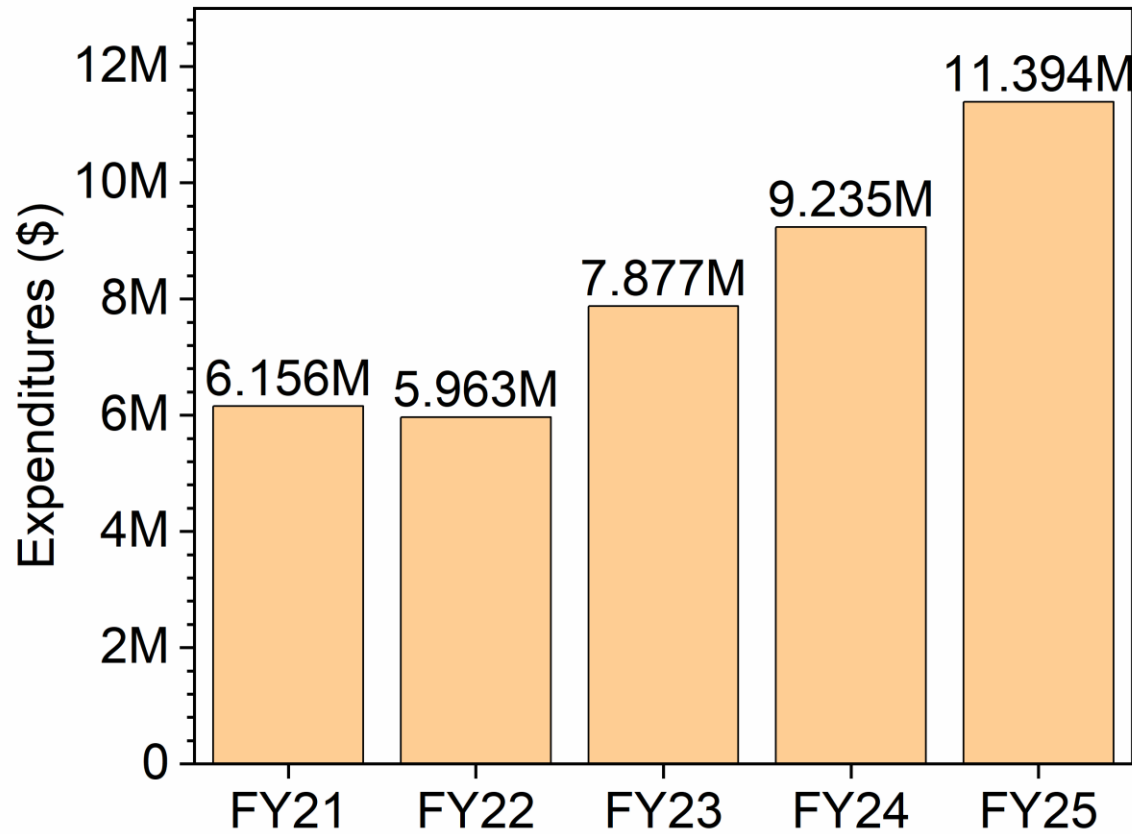
| Revenue stream            | Revenue (\$) |
|---------------------------|--------------|
| F&A Return                | 1,419,805.90 |
| Contracts & Grants        | 9,241,602.62 |
| VPR Allocation            | 200,000      |
| Internal Services         | 202,966.22   |
| Transfers and Allocations | 80,731.91    |
| Other                     | 149,708.33   |
| FY23 to FY24 Reserves     | 1,400,911.75 |

FY 2025 total revenue: \$ 14,510,892.49

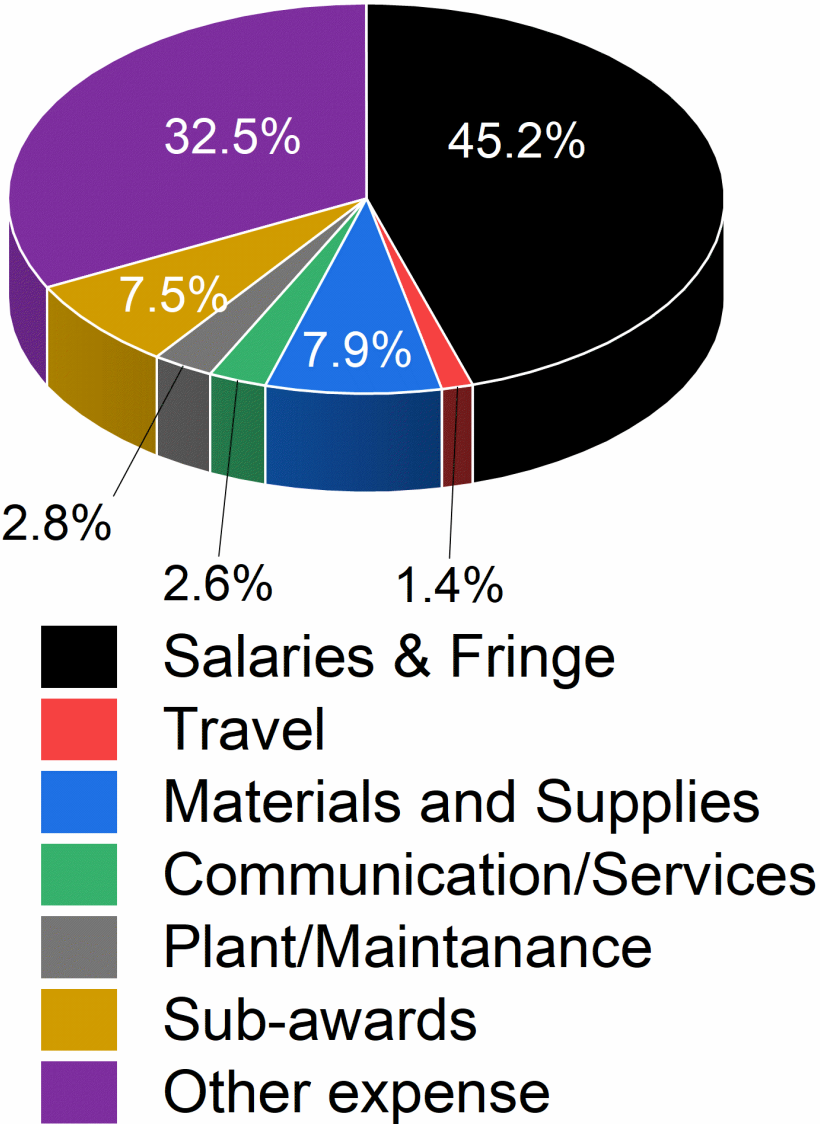


| Revenue stream            | Revenue (\$)  |
|---------------------------|---------------|
| F&A Return                | 1,034,229.71  |
| Contracts & Grants        | 11,439,770.43 |
| VPR Allocation            | 240,000       |
| Internal Services         | 242,277.62    |
| Transfers and Allocations | 0             |
| Other                     | 32,261.67     |
| FY24 to FY25 Reserves     | 1,522,353.06  |

# Research Expenditures and F&A

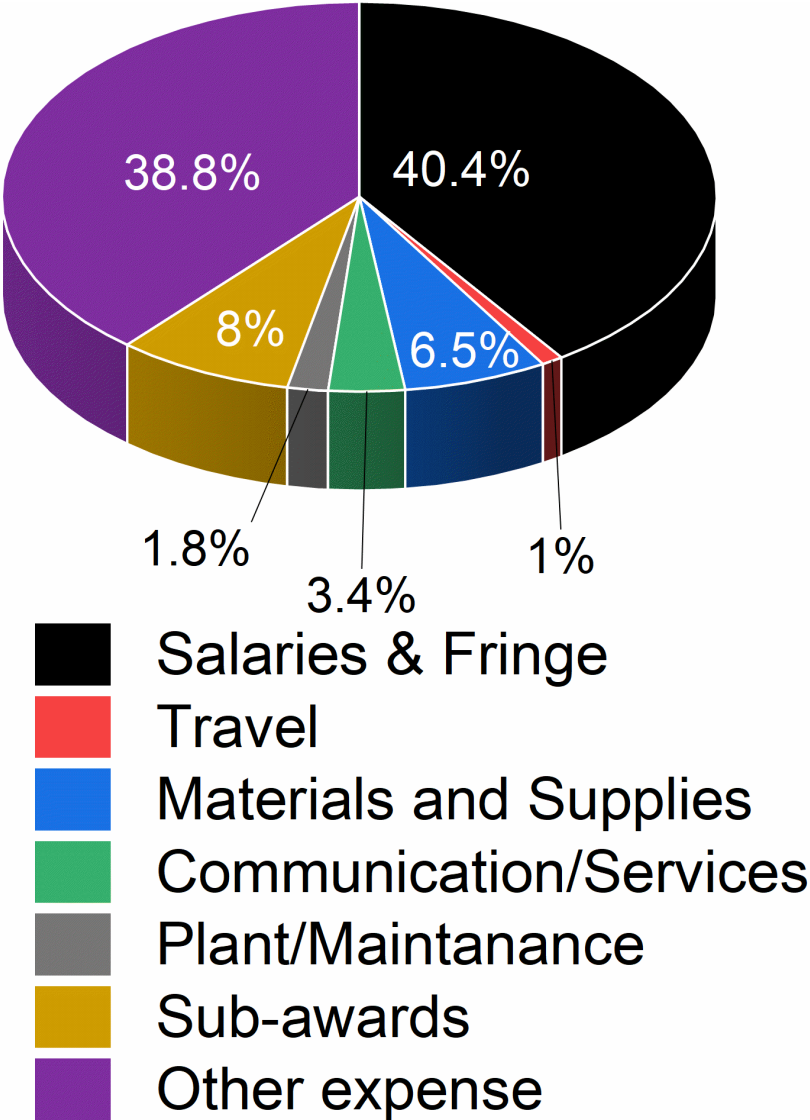


FY 2024 total expenditures: \$11,063,387.99



|                         |                 |
|-------------------------|-----------------|
| Salaries & Fringe       | \$ 5,001,033.53 |
| Travel                  | \$ 156,814.16   |
| Materials & Supplies    | \$ 876,459.17   |
| Communications/Services | \$ 290,706.14   |
| Plant/Maintenance       | \$ 305,549.60   |
| Sub Awards              | \$ 833,645.22   |
| Other Expenses          | \$ 3,599,180.17 |

FY 2025 total expenditures: \$12,916,863.21



|                         |                 |
|-------------------------|-----------------|
| Salaries & Fringe       | \$ 5,223,972.98 |
| Travel                  | \$ 127,008.91   |
| Materials & Supplies    | \$ 842,106.73   |
| Communications/Services | \$ 445,222.64   |
| Plant/Maintenance       | \$ 237,076.23   |
| Sub Awards              | \$ 1,035,766.44 |
| Other Expenses          | \$ 5,005,709.28 |

# Research Center Impacts



## Facilities & Capabilities

- **24/7 Access & Support:**  
Available to UNM faculty, local startups, and National Labs (DoE & DoD)
- **Key Services:** Offering specialized rapid prototyping services to all users
- **Hosted Armonica Tech:**  
CHTM facilities hosted the development of their breakthrough **DNA Nanopore Sequencing Technology**



## Education & Training

- **Academic Curriculum**
  - Hosted ECE474L/574L Microelectronics Processing courses.
  - Hosted ECE595 -ST: Experimental Methods of Quantum Science & Engineering
- **Hands-On Training** Provides specialized lab training for high-school students
- **Workshops & Demos** CHTM hosts equipment trainings and demos open to UNM, national labs, and
- local industry



## Extensive Outreach

### CHTM engages the community through diverse programs:

- QUREACH
- Nano in reach
- Grades 5-8
- Internships for the Deaf & Hard of Hearing
- 5-12 graders summer camps
- Internships in Directed Energy
- Service learning for high school students
- Project-based learning experiences in photovoltaics for high schoolers in Zuni pueblo

# Return on Investment (FY24)

PhD  
Graduates



5

MS  
Graduates



2

Funded Grad  
Students



55

Funded  
Ugrad  
Students



12

Journal  
Papers



28

Awards



17 awards  
\$ 13,062,063

Patents  
Issued



4

Patents  
Filed



31

# Return on Investment (FY25)

PhD  
Graduates



5

MS  
Graduates



3

Funded Grad  
Students



69

Funded  
Ugrad  
Students



25

Journal  
Papers



23

Awards



10 awards  
\$ 6,440,125

Patents  
Issued



14

Patents  
Filed



28

# Industry Engagement

In FY 2024 and FY 2025, CHTM engaged with industry in two primary ways

1. CHTM faculty received over \$ 2,000,000 from industry or working in partnership with industry under STTR awards. This kind of partnerships involved large, medium, and small sizes businesses, including, Intel, NS Nanotech, Lumileds, Nexus Photonics, Northrop Grumman, Google, Inviza Health, ODMR Tech, and Quantum Epi.
2. CHTM hosted small and medium businesses, including 3D glass, Mesa Quantum and Armonica, as users of the shared facilities and space.

## STRENGTHS

- Capabilities in materials synthesis, device processing and characterization of materials and devices
- Integration of research with education and workforce development
- User facility
- A focus on basic and applied science
- Interdisciplinarity
- Specialized staff support on site
- National/International reputation in material and photonics, research
- (Some) Autonomy
- Proximity and strong relationships with national laboratories

## WEAKNESSES

- Lack of process and policies
- Underutilized staff positions and RSS
- Limited space
- Lack of visibility (at UNM and beyond)
- Inconsistent accountability and lack of equity and a sense of belonging
- Shrinking faculty body
- Lack of diversity in home departments
- Reducing cleanroom revenue, aging equipment
- Limited faculty time/resources due to extra responsibilities (dept+center)
- Limited presence and participation to Center's life by faculty, post-docs, and students
- Lack of recurring funding
- Failure to advertise and incentivize scientific output

- Potential for leading an umbrella materials facility at UNM
- Partnership with other Centers (QNM-I, CMEM, MTTC)
- Federal funding (Quantum, CHIPS, Materials, AI)
- Serving local businesses to boost revenue and recognition
- Recurring funds from the state
- Partnership with departments to grow our faculty.
- Available space for new developments on South Campus
- State quantum investment
- Partnerships with other NM entities (Univ, startups, NLs)
- Potential for more interesting/targeted faculty recruitment
- Potential to become more interdisciplinary/increase breadth.

- Targeted resources and opportunities allocations hinder growth of the CHTM's ongoing research and education effort in experimental quantum information science and engineering
- Loosing users to other facilities (CINT, MTTC)
- Capped F&A Return Model
- Instability of federal funding and growing costs
- Uncertainty in CHTM faculty lines (Definition and number)
- Faculty loss to other UNM centers and departments
- Reduced autonomy

## OPPORTUNITIES

## THREATS

# Looking Ahead to Fiscal Year 2026 and 2027

- Hiring a new Director
- Creating a and begin implementing a strategic plan
- Forming a Leadership Advisory Board and conducting an annual review
- Creating policies and processes (i.e., bylaws, MOUs)
- Pursuing significant funding opportunities
  - Potential opportunities include NSF NQNI, DOE Genesis, NSF MRI, DOE EFRC.
- Upgrading/enhancing facilities using state funds
- Expanding relationship with AFRL, Sandia Labs, and LANL
- Expanding research space by creative management of support space
- Reviewing and optimizing staff members' operation
- Completing Phase II designs for the Quantum Materials and Technologies Laboratories