Maria Goeppert Mayer Fellowship Applicant Instructions

Direct questions to fellowships@anl.gov

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EARLY CAREER DEVELOPMENT LEAD | ARGONNE NATIONAL LABORATORY

The Maria Goeppert Mayer Fellowship aims to attract early career researchers who are eager to develop their careers in Argonne's mission-driven, high-impact research environment. Fellows work closely with an Argonne sponsor to pursue their research interests. Fellows are hired as an Argonne Scholar with full benefits, a highly competitive salary and a stipend for research support. Fellows may renew their appointments on an annual basis for up to 3 years, with the possibility of retention. Candidates interested in a research career in a Department of Energy national laboratory are encouraged to apply.

Candidates are selected based on their record of accomplishment and the strength of the research proposal. Proposals must align with one of the following strategic initiatives. Candidates should review the descriptions of the initiatives (available in the next section of this document) before applying.

- Artificial intelligence for science
- Autonomous discovery
- Circular economy
- Climate action
- Coherent X-ray science
- Deep decarbonization
- Imaging and Detection of Signatures (For the national security portion of this initiative only, the selected candidate will be required to obtain and maintain a clearance and must be a U.S. citizen. Please see http://www.state.gov/m/ds/clearances/c10978.htm for more information about requirements for obtaining a security clearance process.)
- Radioisotope discovery

DEADLINE: THE DEADLINE TO RECEIVE ALL THE APPLICATION MATERIALS IS 7:00PM CST, FRIDAY, OCTOBER 1, 2023 FOR THE MARIA GOEPPERT FELLOWSHIP.

Salary and Conditions of Term: Fellowships are renewed on annual basis up through a third year. The first two years of the fellowship are funded 100% by Argonne's Laboratory Directed Research Development (LDRD) Program. The third year is funded 50% by LDRD and 50% by other programs identified by the fellow and sponsor. This model allows fellows to advance independent research as outlined in their fellowship proposal, while making significant contributions to other Laboratory initiatives.

The Maria Goeppert Mayer Fellowship carries a competitive salary and benefits package. Following acceptance of offer, sponsors will ensure that fellowship proposals meet the required Department of Energy approvals. **Appointments may commence on or after October 1, 2024. Fellows will be located at Argonne National Laboratory, in the home division of the sponsor**.

Candidate Eligibility: Candidates must be within three years of having received the Ph.D. at the time of application or be in the process of completing their degree requirements. All Ph.D. requirements must be met at the commencement of the appointment. Questions regarding eligibility should be directed to fellowships@anl.gov.

Qualifications We Require:
- Ph.D. conferred within three years at the time of application or completion of Ph.D. requirements by commencement of appointment
- Evidence of academic achievement with potential for technical and research leadership
- Research in areas that align with Argonne's mission

Qualifications We Desire:
- Demonstrated leadership through collaborations, service on committees, outreach, professional society engagement, etc.
- Creativity and motivation
- Excellent communication skills
- Alignment with Argonne's Core Values: Impact, Safety, Respect, Integrity, and Teamwork.

SECTIONS IN THIS DOCUMENT

- Major Initiative Descriptions
- How to apply
  - Application materials
  - Guidance for transcripts
  - Supporting Materials
  - Guidance for recommendation letters
- Review process and timeline
- Summary of review criteria
- Appendix:
  - Proposal template guidance
  - Advice for preparing your CV
  - Frequently asked questions
  - Proposal template preview

- *Artificial intelligence (AI) for science*

  Topics include deep learning and scalable data analytics for scientific workflows, algorithms, software, and applications for the beyond-Moore era (quantum and neuromorphic), and integration of advanced computing across Argonne. This area also focuses on the opportunity to apply AI methods to both fundamental and applied problems. Emphasis is placed on the combination of high-throughput experimental and computational methods with new computational architectures to enhance the potential for AI-guided science breakthroughs using massive data sets.

- *Autonomous discovery*

  This area focuses on scientific problems that can be solved by accelerating discovery through the application of AI models to drive the design of experiments. This area is seeking to answer fundamental problems through successive iterations of experimental data generation and AI model improvement. Emphasis is placed on laboratory automation, programming abstractions for laboratory protocol development, and AI methods that crosscut scientific domains, including those associated with active learning.

- *Circular economy*

  Topics addressed in this focus area include autonomous design of recyclable polymers; development of pathways for waste management and recovery of critical materials from battery, e-waste, and permanent magnets; advance supply chain research and life-cycle analysis; and establishment of design principles for carbon management with a focus on new materials and processes for carbon capture, conversion, and temporal sequestration.

- *Climate action*

  This area has a two-part focus: AI to advance predictive understanding of climate risks impacts and decision science to help to empower communities and businesses to build long-term resilience to local impacts. Topics include development of AI and machine learning (ML) methods for high-resolution, built-for-purpose climate models, scale- and process-relevant observation, and AI/ML-driven translation of local climate predictions into actionable adaptations.

- *Coherent X-ray science*

  - *Accelerator research and development*

    This area supports seed research for future accelerator-based X-ray source concepts and enabling accelerator technology that can expand the scientific capabilities of existing and future sources. This includes concepts for compact hard X-ray free electron lasers, high-gradient acceleration, novel permanent magnet and superconducting undulators, and ultralow-emittance electron sources.

  - *Hard X-ray sciences*

    Topics in this focus area address development of innovative Xray techniques and approaches to transform our understanding of material, chemical, and biological processes. The focus includes application of high-performance computing and AI/ML approaches to data analysis and experiment control, enabling new science at the APS and novel X-ray techniques that will translate the promise of the upgraded APS into some of

the first scientific results on the feature beamlines. Research and development of new beamline enhancements will also be supported.

- ### *Deep decarbonization*

  This area addresses two broad topics. The first is low- or zero-carbon energy carriers, with a focus on developing capabilities to characterize the use of such energy carriers and advancing technologies for manufacturing them. The second is identification and advancement of new routes for decarbonized production of metals and chemicals, with a focus on developing new chemistries, identifying process conditions that can tolerate intermittent energy supplies, identifying methods for integrating decarbonized energy sources, developing materials that can withstand the high temperatures and corrosive environments required for generating process heat from low-carbon sources, and developing materials for thermal energy storage.

- ### *Imaging and detection of signatures*

  This area focuses on advancing the science of sensing, detection, and imaging of signatures to enable scientific discoveries and translate those discoveries to benefit U.S. national security. Topics include expanding the portfolio of detectors and sensors for nuclear and particle physics research; supporting fundamental research in quantum sensing and imaging and translating those discoveries into sensors and detectors for national security missions; establishing "end-to-end" capabilities to accelerate the development of sensors and detectors for multiple missions; and AI/ML-driven prediction, development, and analysis of novel chemical, biological, and nuclear signatures and advanced detection methods and technologies. For the national security portion of this initiative only, the selected candidate will be required to obtain and maintain a clearance and must be a U.S. citizen. Please see http://www.state.gov/m/ds/clearances/c10978.htm for more information about requirements for obtaining a security clearance process.

- ### *Radioisotope discovery*

  This area focuses on novel methods to enable production of isotopes that are presently in short supply but needed for a variety of research and applications. The emphasis is on radioisotopes useful for nuclear medicine. This includes development of new approaches for challenging aspects of radioisotope production, advanced targetry to compensate for high-power-density deposition in targets, radiochemical separation and purification, and generation and analysis of nuclear data. Also of interest are concepts that incorporate AI/ML and robotic technologies.

Candidates must apply to **requisition 416142** on the Argonne Careers page and upload the following documents. The research proposal and graduate transcripts should be uploaded under the Supporting Documents section in the Workday application portal. **Once your application is submitted, you will not be able to make changes.**

1. **Research Proposal:** Proposals should be submitted using the Research Proposal Template. Candidates should name the proposal document with an identifiable name such as **YourLastName_ResearchProposal.** For detailed instructions, refer to the Research Proposal Template Guidance in the appendix. Both the guidance and template are accessible on the fellowships website. A sample template is provided at the end of this document for reference.

2. **Curriculum Vitae (CV),** including list of publications, significant presentations, patents and other relevant activities that demonstrate research productivity, independence, leadership experience and other pertinent skills. See appendix for tips on preparing your CV. Candidates should name the proposal document with an identifiable name such as **YourLastName_CV.**

3. **Graduate School Transcripts:** Candidates should name this document with an identifiable name such as **YourLastName_Transcripts.**
   - Transcripts must include the name of the school, the student's name, the school's watermark, official seal or symbol and the Registrar's signature. If degree has been completed, transcripts must reflect degree date.
   - If the school does not provide transcripts, a copy of a diploma or letter from the Graduate School Office stating that you are enrolled or have completed all the requirements for the Ph.D. is acceptable. This letter must be on official school letterhead and signed by a representative from the Graduate School Office.
   - If the transcripts are not in English, please provide one of the following in addition to the transcripts:
     - Translation of the information contained in the transcript
     - Brief summary of the information contained in the transcripts
   - The following documents will not be accepted as Graduate School Transcripts: Unofficial grade reports downloaded from the university intranet, Documents missing the student's name or school's name, Documents missing the degree date.

Status of your application: To inquire about the status of your application, please send an email to fellowships@anl.gov

1. **Three letters of recommendation from other than Argonne staff**. **Consult fellowships@anl.gov if a potential reference is on staff at Argonne.**
   - It is strongly recommended that candidates request letters from individuals who are familiar with the candidate's work and can comment confidently on:
     - Candidate's ability to perform independently and on a team
     - Leadership qualities and ability to communicate effectively
     - Candidate's demonstrated independence of thought, ingenuity and maturity
     - Major accomplishments and contributions to the candidate's field
     - How the candidate ranks compared to others at a similar career stage in the field
   - Letters are preferred to be in PDF format from the individual(s) with a signature on official letterhead. In the subject line please include the name of the candidate.
   - Submitting more than three letters does not confer competitive advantage. Only the first three letters received will be included with the application package for committee review.
   - Late materials may not be accepted once the review process has begun.

TENTATIVE TIMELINE FOR REVIEW

- Initial review of proposals for strategic alignment (October)
- Lab-wide committee reviews applications and provides initial ranking (October-November)
- Top candidates matched and connected with Argonne sponsors (November-December)
- Top candidates interviewed virtually (December-January)
- Sponsors of top candidates interviewed by committee (December-January)
- Committee advises Laboratory Director on final rankings (January)
- Finalists notified by late January or early February

SUMMARY OF REVIEW CRITERIA

The required and desired qualifications stated in the call for applications will guide the review of application packets. In general, the committee will review the CV, investigator background and letters of recommendation for examples illustrating:
- Leadership Potential
- Innovator/Problem Solving Skills
- Collaborative Skills and Potential
- Communication Skills
- Record of Accomplishment

In general, the committee will review the proposal for:
- Clear alignment to major/strategic missions
- Innovative approach to the stated problem
- Broader impact on the field and laboratory mission
- Feasibility within a 3-year timeframe, with the appropriate resources
- Clear goal, objectives, and realistic timeline

APPENDIX

MARIA GOEPPERT MAYER FELLOWSHIP PROPOSAL TEMPLATE GUIDANCE

Read these instructions before completing the proposal template. They explain, in detail, what is expected of each section. Fellowships are funded through the Laboratory Directed Research and Development Program.

Proposals will be reviewed by the Lab-wide Named Fellowship Review Committee. It is important that candidates write for a broad technical audience.

Upon selection, proposals will be submitted for DOE approval. Providing the requested information will prevent delays in the approval process.

The last page provides space for the candidate to describe their research background, achievements and leadership experience and career goals.

COVER PAGE—PAGE ONE (ONE PAGE LIMIT)

Project Title: The title should be descriptive and appeal to a wide audience. Do not use acronyms, chemical symbols or abbreviations in your title as the DOE reporting system will reject those titles.

Name: Enter your name

Major/Strategic Initiative: Enter the major/strategic initiative to which this proposal aligns. This must be one of the 9 areas listed in call for applications, the fellowship website and the applicant instructions.

Proposal Summary/Abstract (limit to around 100-200 words):

Elevator speech summary or abstract of the proposed research, **written for a broad audience that will include experts outside your field.**

The summary should address the following questions:

- What is the proposed research?
- Why is it important?
- Why does this research merit a fellowship at Argonne?

The following sites provide tips for writing for a broad audience:

- https://www.anl.gov/education/writing-a-general-audience-abstract
- https://www.aaas.org/resources/communication-toolkit
- https://plos.org/resource/how-to-write-a-great-abstract/

RESEARCH PLAN—PAGE 2-3 (TWO PAGE LIMIT)

This proposal will be reviewed by a Lab-wide review committee whose members have diverse scientific and engineering backgrounds. Please write with a broad, multi-disciplinary audience in mind. The following sections should be included:

- **Research Goal:** Describe the ultimate research goal for this project.
- **Research Opportunity:** Clearly articulate the main idea of your proposed research, including
  - The exploratory research opportunity which the project addresses.
  - The innovative or breakthrough potential of the proposed project.
  - The novelty of the research – explain how this research will be different from work done currently at Argonne and how it is different than research being pursued in the greater scientific community.
- **Research Description:** Detailed research plan discussing how you plan to approach your research goal.

REFERENCES AND FIGURES—PAGE 4 (ONE PAGE LIMIT)

This page may be used for technical references and figures.

PROJECT PLAN AND RETURN ON INNOVATION—PAGE 5 (ONE PAGE LIMIT)

- **Resources:** Describe the resources required to accomplish your proposed research including, but not limited to:
  - Equipment or facilities at Argonne
  - Technical or engineering support and use of user facilities.
- **Research Milestones**
  - Provide a tentative timeline for your three-year project and anticipated deliverables.
- **Return on Innovation:**
  - Alignment with Mission: Clear statement of the project alignment with both the DOE mission and Argonne's strategic direction. Work with your sponsor on assessing whether your proposal aligns with DOE and Argonne missions.
  - Expected Outcome: LDRD is the seed fund for Argonne's future. Please describe the expected return if you meet your R&D goal. **How will this research position the PIs and Argonne as a leader?**
  - Roadmap: Describe in detail the roadmap for accomplishing the expected return.
    - For future funding opportunities, describe the funding source.
    - Anticipated deliverables, for example, future funding, partnerships, publications, intellectual property, capabilities that can be leveraged and reputation that leads to programmatic growth.

- Provide a short summary of any current or past research relevant to the proposed research in this LDRD.
- Expand on leadership roles, collaborations, outreach activities, committees, professional service and other significant experiences.
- Expand upon interests in advancing your career in a mission-driven, high-impact research environment with the DOE national laboratories.
- This section will replace the traditional application cover letter, so take that into account.

TIPS FOR PREPARING YOUR CV

This section is not a format guide. You should format your CV according to your own personal style. In general, a CV typically contains the following information.

Contact Information:

- Name, current mailing address, preferred telephone number and email address.
- A current trend is to provide a link to your LinkedIn profile.
- Do NOT include specific information such as date of birth or social security number.

Background and Experience:

- Education
- Research or other Work Experience
- Record of research output: Publications, conference abstracts/proceedings, presentations, patents, code and use, media mentions, etc.
- Awards/Accomplishments—provide context for specific awards, when possible
- Leadership Experience and Volunteer Activities
- Summary of skills and strengths the candidate wishes to highlight]

Include numbers, when possible, to provide context:

- Granted Best Graduate Student Award—awarded to one person every 10 years from an applicant pool of 10,000 applicants
- Contributed to NSF-funded proposal ($4M over 4 years)
- Patent/IP disclosure #D00506T led to $X of investment funding
- University Best Dissertation Award—awarded annually to on student across the entire university (1:1000 award rate)
- Mentored 5 undergraduates and 3 graduate students over 3 years
- Code used by X# researchers; highlighted at conference

1. **Is U.S. citizenship required?**

   No.

2. **Is there an age restriction?**

   No. However, fellowship recipients must recently (within 3 years) have received a Ph.D. or be in the final stages of their graduate program.

3. **I received my Ph.D. more than 3 years ago, but there are circumstances I believe should be considered in determining my eligibility. How should I proceed?**

   Please send inquiries regarding eligibility to fellowships@anl.gov.

4. **Is there an application form?**

   Candidates must upload the required documents as outlined above through the application portal. If selected, candidates will be asked to complete an employment application to complete the administrative requirements for the appointment.

5. **What is the mailing address for the application materials?**

   There is no mailing address. All supporting letters should be sent to fellowships@anl.gov. In the subject line please include the name of the candidate. The candidate's application documents should be submitted electronically through the application portal.

6. **Where will the Fellow work?**

   The individual will work at the Argonne National Laboratory site in Lemont, IL in the sponsoring Research Division.

7. **Can I scan the official transcripts and submit a PDF file along with the other materials?**

   Yes. In fact, you will need to upload your transcripts directly to your application account. However, if selected, you will need to bring the original documents when you report for employment.

8. **When will I receive an acknowledgement regarding my application?**

    Updates will be sent to all candidates when the application package is complete and when the review commences. Communications will be sent from fellowships@anl.gov. Please add this address to your contacts to avoid missed communications.

9. **When will the recipient's names be announced?**

    If selected, the individual will be contacted by e-mail approximately in early February after the application deadline. Those not selected will also be notified by e-mail at a later time.

10. **When will the recipient begin their appointment?**

    Maria Goeppert Mayer Fellowship appointments may begin on or after October 1st after selection. The candidate cannot commence the fellowship appointment until the Ph.D. degree has been conferred.

Refer to Fellowship Proposal Template Guidance for detailed instructions on completing each section.

Page 1—Cover Page

Project Title:	Enter title here
Name:	Enter your name here
Major/Strategic Initiative:	Enter the major/strategic initiative to which this proposal aligns. This must be one of the areas listed in call for applications, the fellowship website and the applicant instructions.

Proposal Summary: Enter text here

Pages 2-3—Research Plan

Research Goal: Enter text here

Research Opportunity: Enter text here

Research Description: Enter text here

Page 4—References and Figures

Page 5—Project Plan and Return on Innovation Project Plan

Resources Needed: Enter text here

Research Milestones: Enter text here

Return on Innovation

Alignment with Mission: Enter text here

Expected Outcome: Enter text here

Roadmap: Enter text here

Page 6—Additional Information

Investigator Background: Enter text here