SCGSR Program by the Numbers

"The SCGSR program has been the most valuable part of my graduate education."

Christine Burgan 2022 S2

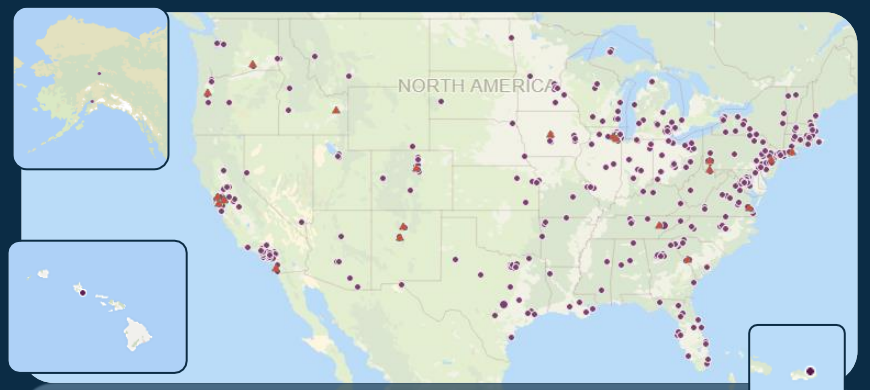
Since **2014**

1214 awardees from

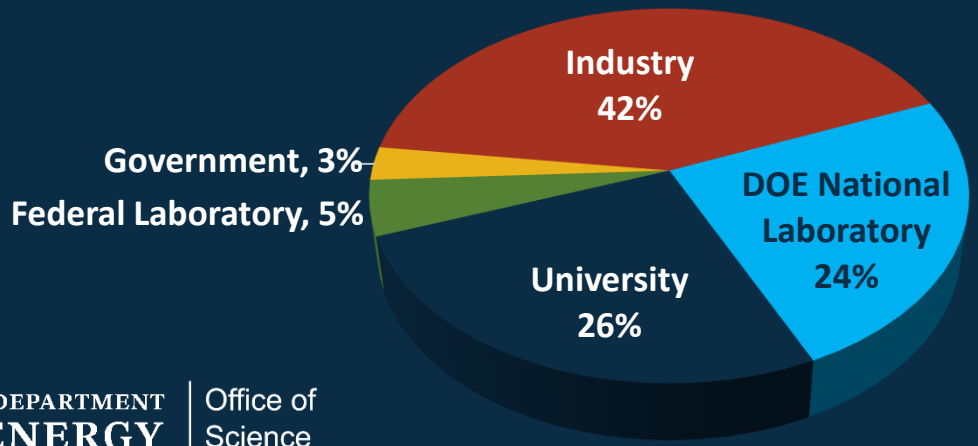
476 hometowns in

48 States + DC + Puerto Rico, pursuing PhDs at

168 Universities, working with **860** DOE National Laboratory scientists



SCGSR Alumni Work in…



>800 Research articles

>750 Research presentations

>100 International Presentations

10 Patents

WHAT AWARDEES SAY ABOUT SCGSR

99% Received training not available at their universities

99% **Expanded their networks**

99% SCGSR introduced them to careers outside academia

100% **Their SCGSR award led to completion of a key part of their PhD dissertation**

U.S. Department of Energy

OFFICE OF SCIENCE

Office of **SC**ience **G**raduate **S**tudent **R**esearch (**SCGSR**) Program

Application Assistance Workshop 2 for 2025 Solicitation 1

April 10, 2025

Welcome! Please answer the following question in the chat box:

What has been the hardest part of applying to the SCGSR program so far?

U.S. DEPARTMENT of ENERGY | Office of Science

SCGSR Program Management Team

U.S. Department of Energy (DOE), Office of Science (SC)

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- Abby Robbins
  Program Specialist
  Workforce Development

Schedule

(All times East)

> *"This SCGSR project has been an incredible experience. In addition to the reported advancements of my thesis research, I was able to get to know and gain an appreciation for the incredible scientists and staff at ORNL. The capabilities and breadth expertise at this lab are awe-inspiring."*
>
> SCGSR 2023 S1 Awardee

2:00-2:50 PM Webinar:

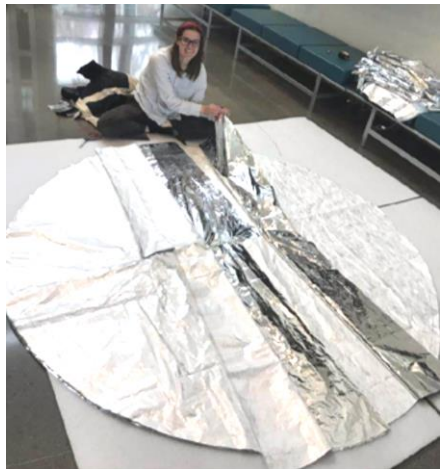
- The SCGSR Program
- Evaluation of the Applications
- Proposal format
- Tips on Proposal Writing
- **Q&A**

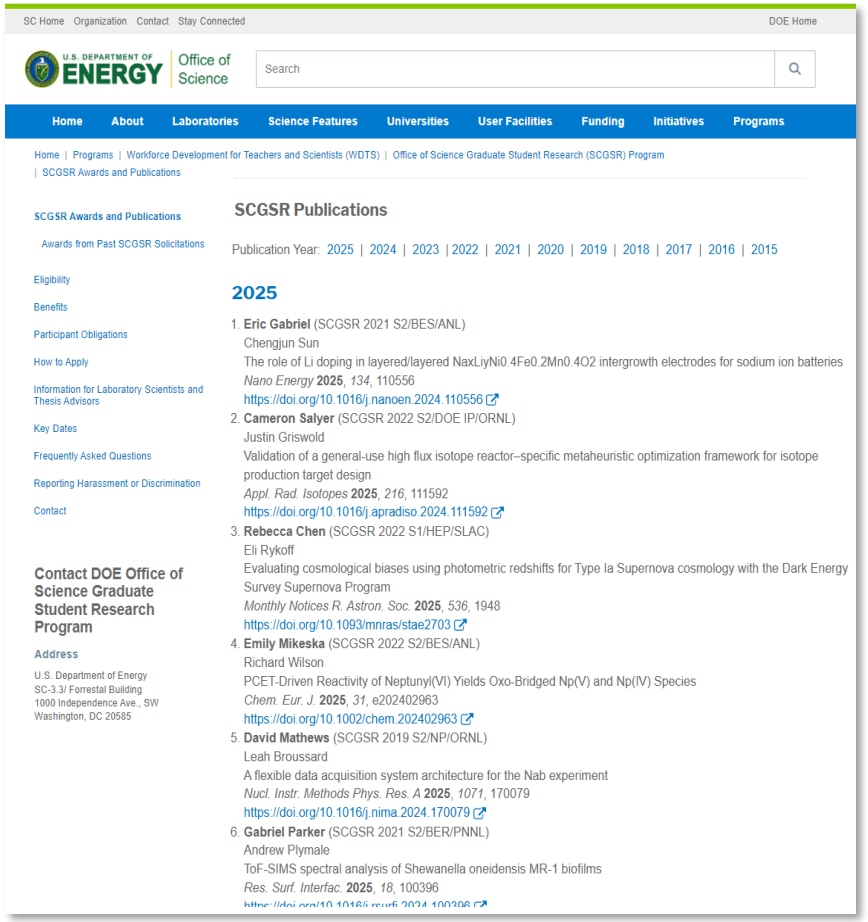
3:00-3:30 PM **Panel I: Recent SCGSR Awardees** (2 parallel panels)

3:30-4:00 PM **Panel II: DOE National Lab Scientists** (3 parallel panels)

SCGSR Supports PhD Students whose Research…

- Advances our **fundamental understanding of nature**
- Develops tools or methodologies that **enable scientific discovery**





https://science.osti.gov/wdts/scgsr/SCGSR-Awards-and-Publications

59 SCGSR Research Priority Areas

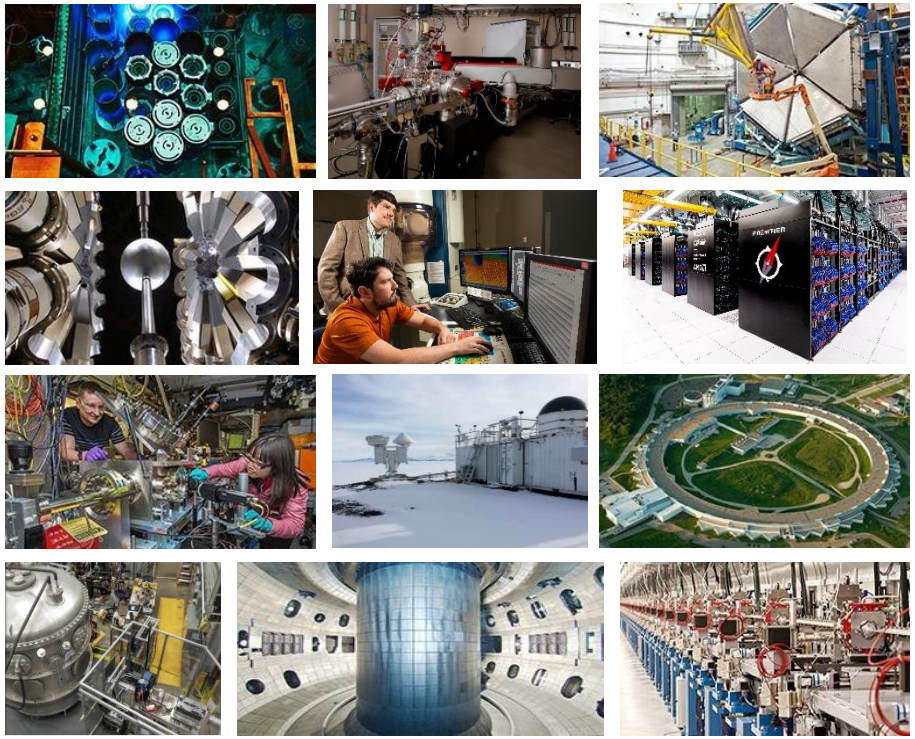
Advanced Scientific Computing Research (ASCR)	Mathematics, Computer and Computational Sciences, etc.
Biological and Environmental Research (BER)	Biology (non-medical), bioinformatics, environmental science, plant science, microbiology, atmospheric science, earth systems modeling, etc.
Basic Energy Sciences (BES)	Chemistry, Materials Science, Geosciences, Chemical Physics, e[illegible]
Isotope R&D and Production (DOE IP)	Separations, radiochemicals, imaging, enrichment, etc.
Fusion Energy Sciences (FES)	Plasma physics, magnetic confinement fusion, energetic [illegible]les dynamics, etc.
High Energy Physics (HEP)	Theory, experiment, accelerator and detector technologies
Nuclear Physics (NP)	Theory, fundamental symmetries, QIS, AI, accelerator and detector technologies, etc.

Convergence Areas

Exclusions!

SCGSR Supports PhD Students whose Research…

Needs advanced/unique instrumentation and/or expertise available at US DOE National Laboratories – What part of your work needs resources that are there?

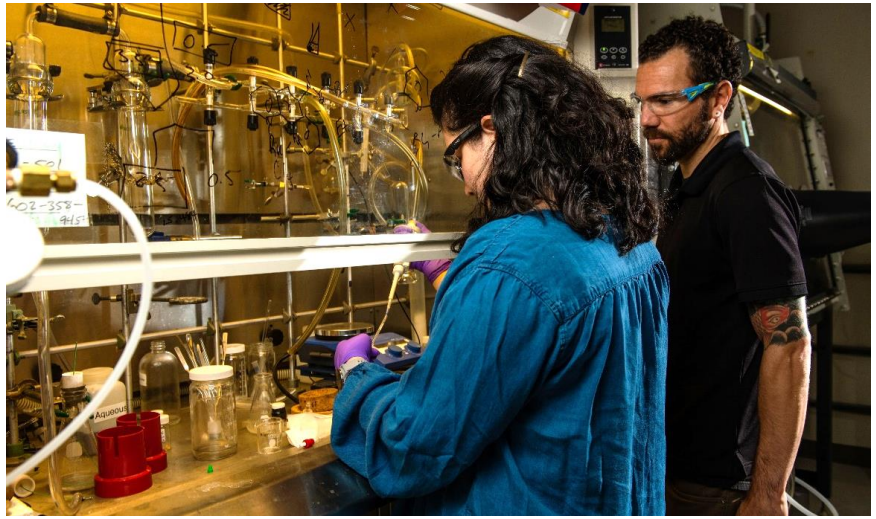


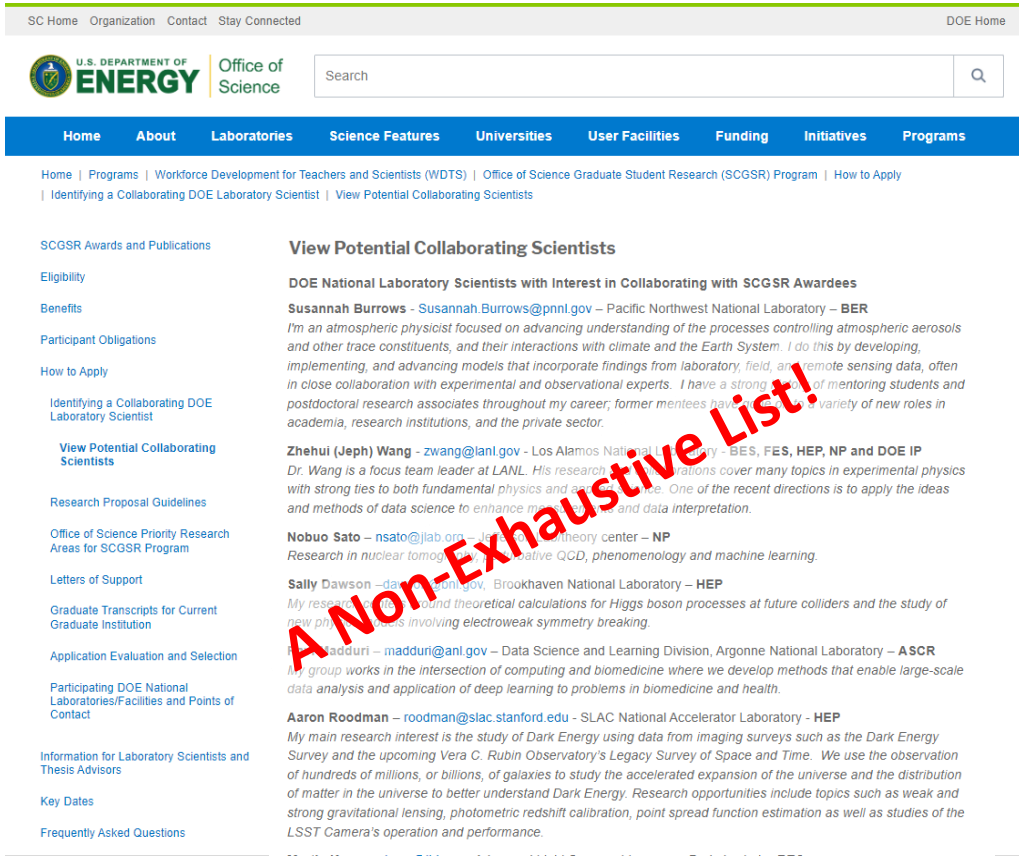
https://www.energy.gov/national-laboratories

https://science.osti.gov/User-Facilities/User-Facilities-at-a-Glance

Finding a Collaborating Scientist

Literature • Network • Labs Websites • SCGSR Website https://science.osti.gov/wdts/scgsr/How-to-Apply/Identifying-a-Collaborating-DOE-Laboratory-Scientist/View-Potential-Collaborating-Scientists





Today's advice:

- SCGSR awardees panel (3:00-3:30 PM)
- National lab scientists panel (3:30-4:00 PM)

Write to us and we can help with your search

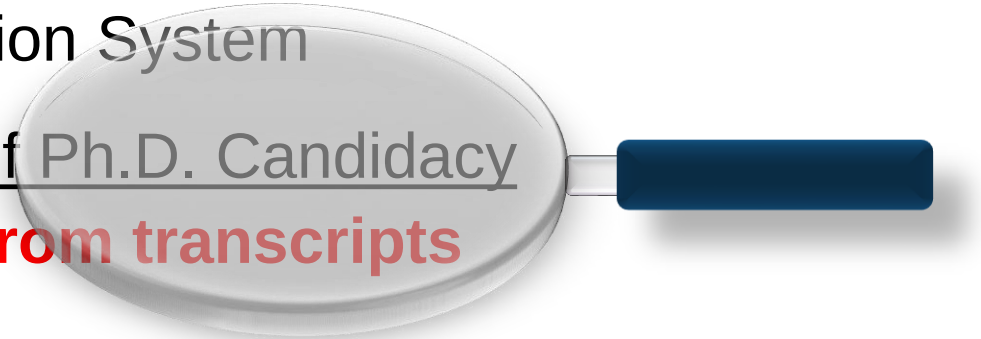
SC.SCGSR@science.doe.gov

SCGSR Applications

Only COMPLETE applications will be considered!

1. All required fields of the Online Application System
2. Official graduate transcripts and proof of Ph.D. Candidacy

   Remove SSN or dates of birth from transcripts



3. Letters of Support: - graduate thesis advisor
   - collaborating DOE national laboratory scientist
4. Research Proposal (**3-pages maximum**)

Deadline: May 7, 2025, 5:00 PM ET

Proposal Structure

1. Overall Goal:

Overarching problem or question? **THE BIG PICTURE!**

2. Background:

Current understanding/state of the art? **UP TO DATE!**

Relevance? **THE BIG PICTURE!**

Fit in an SCGSR priority research area?

Broadly: how can this problem/question be answered? **GENERAL STRATEGY**

Preliminary results/data suggesting your idea may work? **CREDIBILITY**

3. Specific aims:

Basis for your research plan. Split Goal into smaller targets.

4. Approach:

Strategy, general steps with rationale. Will you use the best methods there are?

What will you be doing in the lab from day 1? **SPECIFICS**

What results do you expect? The impact of your work.

Potential problems? **PREPAREDNESS**

5. Timeline:

Expected pace of progress?

3 pages

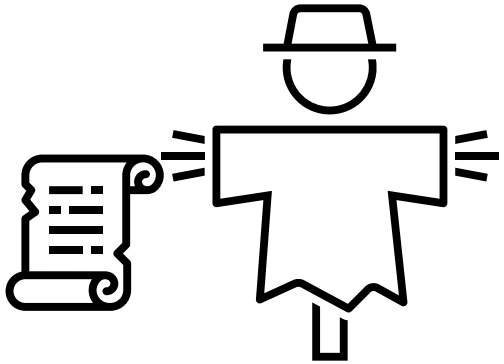
6. References:

Separate **1** page.

USE IT!

Build in time for trainings!

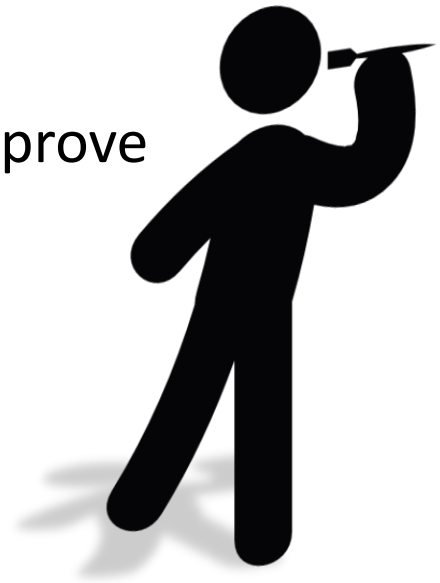
A Straw Man Proposal



A quick draft for brainstorming

- Start with bullets
- Include all ideas: good and bad

  -> then you can trim and improve
- Beef the surviving bullets up
- Connect the bullets



Help your Reviewers: Wording Typical of Key Elements

The *aim* of my research is to develop *the scientific basis* for…..
This work will deepen the *fundamental understanding of* ….

Goal

XXX is one of the most promising approaches for ….(REF) However, it is not well *understood* the *mechanism* of how XXX….

Background/ Rationale

We have observed that… and… (REF). *Our results suggest* that YYY…

Credibility/ Hypothesis

To determine the potential *role* of YYY on *the mechanism* of XXX… we *propose* to…

Overall strategy

ZZZ at AAA *National laboratory* has developed …*tools* that are ideally suited to text our hypothesis.

SCGSR

Therefore, we propose to *collaborate* with AAA to…. **SCGSR**

We will *first*… *this will determine* whether…. **Steps along with rationale**

Based on the outcomes of… , *we will* either… or …. **Expectations/Strategy**

It is *possible* that…, in this case we will… **Contingency plans**

Ultimately, we *expect* to… **Expected results**

Reaching this understanding *addresses the grand challenge* listed in the report… (REF or link). **Overall goal – Relevance to SC Mission/Impact – Vision**

Aligning Proposal to SC Mission/SCGSR Priority Research Areas

https://science.osti.gov/wdts/scgsr/How-to-Apply/Priority-SC-Research-Areas

Program office's websites:

- Basic research needs reports ➡ grand challenges: does your research aim that way?
- PI meeting/workshop reports for some of their divisions ➡ find potential collaborating scientists

Find them along with many other document types at:

- ASCR: https://science.osti.gov/ascr/Community-Resources
- BER: https://science.osti.gov/ber/Community-Resources
- BES: https://sc.osti.gov/bes/Community-Resources
- DOE IP: https://sc.osti.gov/Isotope-Research-Development-and-Production/Resources
- FES: https://sc.osti.gov/fes/Community-Resources
- HEP: https://sc.osti.gov/hep/Community-Resources
- NP: https://sc.osti.gov/np/Community-Resources

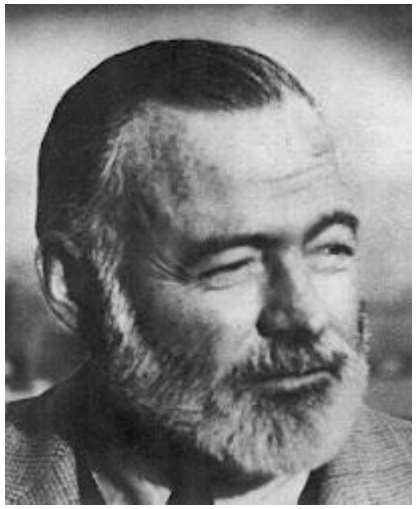
EXERCISE

Write down your overall research goals in 2-3 sentences

1. Start rough, polish later

2. Short and meaningful sentences

3. Avoid being wordy



Good old Hemingway (?):

The shortest short story (??)

EXERCISE

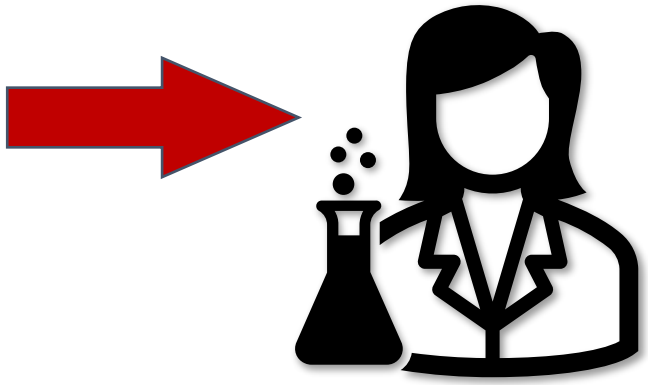
List 5 tools, methods, and/or techniques* that you would need to reach your research goals

*Not available at your home university

Explain briefly:

- Why do you need them?
- How would you use them?

Homework: which DOE National Lab has them?



Proposal Review Criteria

1. Scientific and/or Technical Merit of the Proposed Research
a. Is the proposed research **well-conceived**, and does it demonstrate a **clear understanding** of the scientific and technical challenges involved? b. Is the proposed **method and approach** for the proposed research appropriate? c. Is the applicant **sufficiently prepared** to conduct the proposed research? d. Are the DOE laboratory **resources** adequate? If applicable, has the necessary access to a scientific user facility been secured?
2. Relevance of the Proposed Research to Graduate Thesis Research and Training
a. Does the proposed research have the potential to make a **significant contribution to the applicant's PhD thesis** research project? b. Will the proposed research enhance the applicant's **training and research skills**?

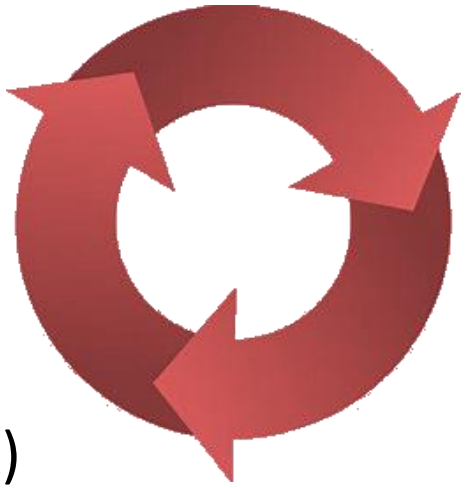
EXERCISE

Grab Your Proposal Draft and Assess it Based on the Review Criteria

Even better… ask a friend to do it for you
(just don't get mad about criticisms)

Check flow:

- **Logic of the ideas**: How articulate and complete is the reasoning? Are there any gaps?
- **Readability**: Can they understand what you meant to say?



Rate each item of the criteria on a 1 – 4 scale
(yes… that is arbitrary, but gives you an idea of what needs more work)

Write-Feedback-Write

Common Observations by Reviewers

1) **Clarity**: make readers' lives easier: *identify* **key** points for them
   - discussions around key ideas – articulate connections

2) How well defined is your **hypothesis or problem statement** → how well you can design your activities
   - Are your research activities adequately designed to **test the hypotheses**?
   - How well can you control or account for key **variables/parameters/conditions**?
   - Will they provide **new insights**? Lead to new questions? **Impact** on the scientific community!

3) Identifying **challenges** → "Good understanding of the challenges" → you understand the science
   - Contingency plans

4) Are methods/conditions/model systems/tools appropriate? The **best tools** for your scientific problem?

5) Could you do this in your university?

By far the most common complaint!

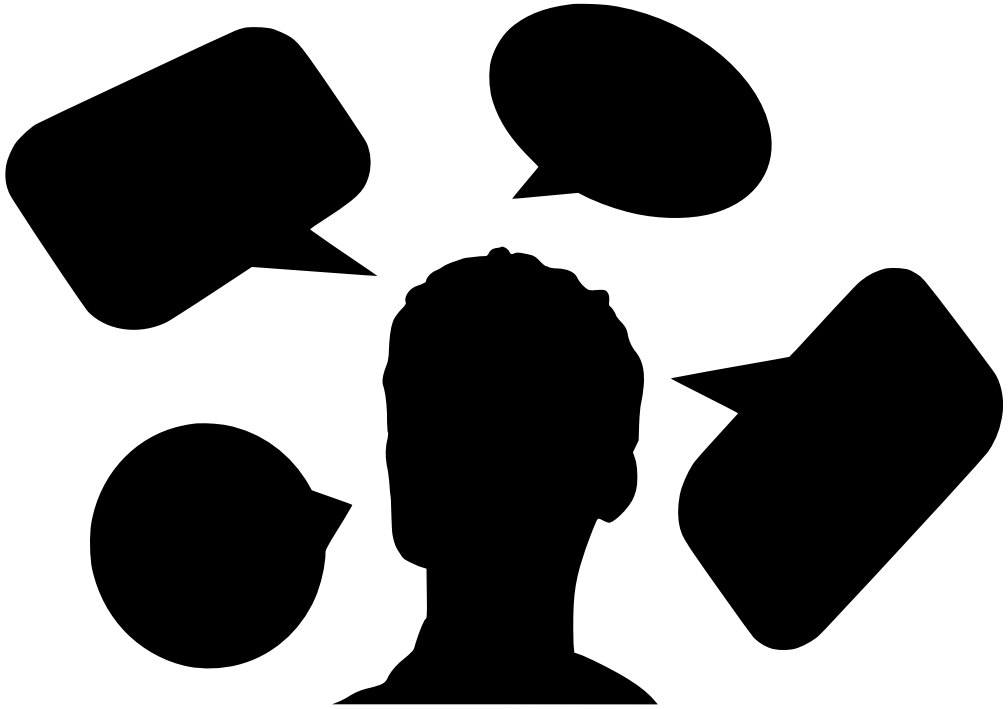
6) Essential **DETAILS**: not all the details but the most relevant ones to understand the work you plan to do.

Keep in Mind

Reviewers are smart: they won't fall for attempts to embellish an idea or cover some deficiency – be honest and go straight to the point

Reviewers are busy: don't make them lose time with items that aren't needed

Reviewers are multitasking: short sentences go a longer way

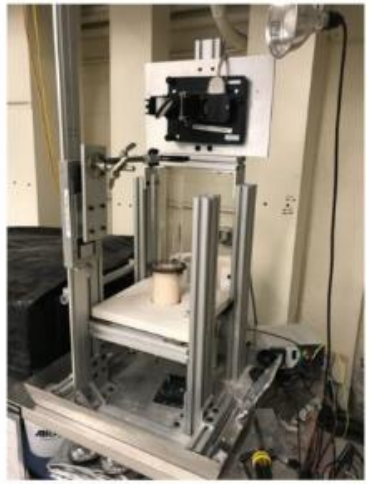


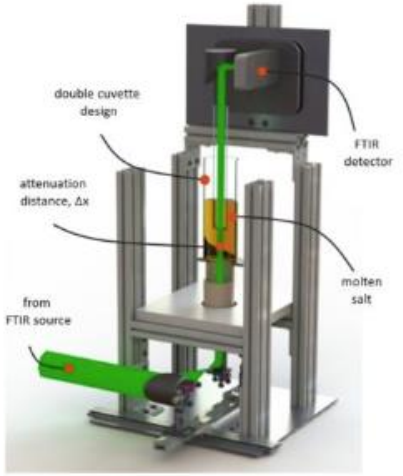
Crafting an engaging narrative

1. **Learn the Craft**
   - Make complex ideas accessible yet accurate
   - ➢ *Be mindful of "click-bait" pitfalls*
2. **Hone Your Skills**
   - Practice and refine
   - ➢ *Creativity blossoms in times of quiet reflection*
3. **Choose Your Market**
   - Be mindful of format
   - ➢ *Tailor your proposal to align with SCGSR criteria*
4. **Your Responsibility as a Science Writer**
   - Ethics, sources
   - ➢ *Be curious, skeptical, and rigorous*

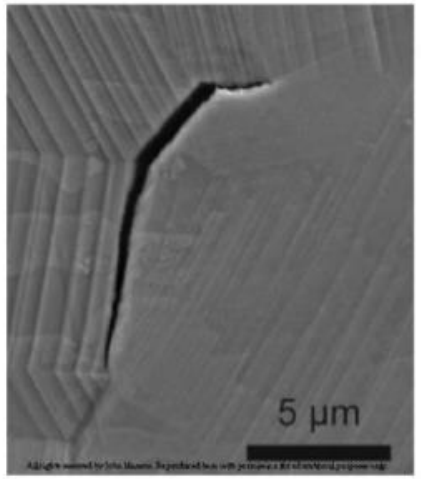
The art of illustrating complex concepts

- Start with a plan – what do you want to convey?





Diagrams and illustrations



Schematics

MIT Nuclear Science & Engineering Communication Lab: https://mitcommlab.mit.edu/nse/commkit/figure-design/

Proposal Samples

In the chat box you will find some sample proposals that former awardees generously agreed to share with you.

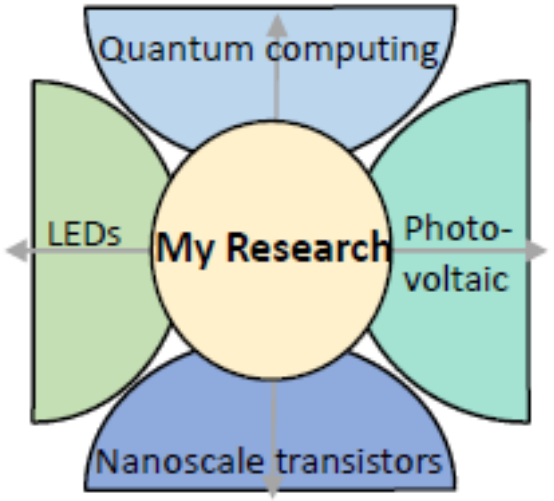
You are welcome to use them as examples, but we ask that you please refrain from distributing them and that you delete them after you have used them (this may be a couple of months from now).

"Working at Sandia has been a truly incredible experience, I am incredibly blessed to be working with so many prolific, kind, and humble people!"

SCGSR 2023 S1 Awardee

Remember a Picture* can be Worth a Thousand Words

*Or a graphic, or a diagram, or a plot, or a table…



Timeline

Activity	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Develop 2D model for bacteria-substrate-infiltration interactions												
Extract metrics from 2D model												
Extend the 2D numerical model to the [redacted] river												
Develop simulation-based model for predicting bioclogging												
Quantify feedback effects on clogging												

Questions So Far?
Discussion Time

"Working on-site at Argonne National Laboratory provided invaluable opportunities for getting feedback from Drs… as well as from other senior scientists and postdoctoral researchers… The skill gain has been tremendous… My SCGSR experience has been the best six month interval of my Ph.D. experience. The fact that my project results are pretty cool is also an awesome outcome."

SCGSR 2023 S1 Awardee

Panels with 2024 S1 SCGSR Awardees

Panel 1:

- **Elizabeth Koning** – ANL – *Computer Science*: GPUs for Large Scale Agent Based Models
- **Ian Norwood** – LANL – *Atmospheric System Research*: Understanding Frictional Charging Effects on Coarse-Mode Dust Settling Times
- **Tatiana Mamani** – LLNL – *Basic Science for Clean Energy and Decarbonization*: First-Principles Investigation of Charged Surface Oxygen Vacancies in Perovskites

Panel 2:

- **Brian Leard** – GA DIII-D – *Burning Plasma Science & Enabling Technologies*: Toward Dual Plasma Equilibrium and Transport Optimization
- **Joyce Christiansen-Salameh** – FNAL – *Quantum Information Science*: 2D materials for phonon-targeted mitigation of quasiparticle poisoning in superconducting qubits
- **Alexandru Sturzu** – TJNAF – *Nuclear Theory*: Probing Three-Dimensional Gluonic Distributions in Nucleons with Lattice QCD

Panels with National Laboratory Scientists

Panel 1:

- **Dr. Maria Chan** – ANL – Machine learning for property predictions in nanomaterials and renewable energy
- **Dr. Emily Warren** – NREL – High efficiency crystalline photovoltaics
- **Dr. Christopher Shaddix** – SNL – Laser diagnostics, soot formation, biomass combustion and gasification
- **Dr. Mark Jones** – TJNAF – Experimental studies of the fundamental nucleon electromagnetic form factors

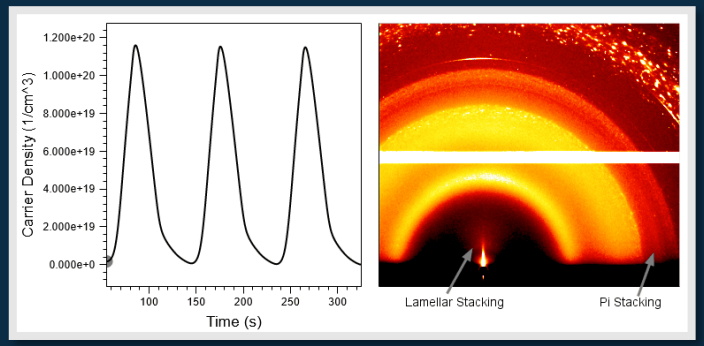
Panel 2:

- **Dr. James Wishart** – BNL – Molten salts in extreme environments
- **Dr. Daniel Feldman** – LBNL – Climate modeling and remote sensing
- **Dr. Minerba Betancourt** – FNAL – MINERvA Experiment, Short-Baseline Neutrino program, DUNE detector
- **Dr. Fatima Ebrahimi** – PPPL – Theoretical and computational plasma physics

Panel 3:

- **Dr. Gregory Holmbeck** – INL – Radiation and radiochemistry of nuclear fuel cycle related challenges
- **Dr. Dustin McIntyre** – NETL – Laser based probes for optical sensing in harsh environments
- **Dr. Samantha Davis** – ORNL – Community ecology
- **Dr. Nancy Washton** – PNNL – Generative AI and cloud computing in catalysis science and scientific research

Thank You!

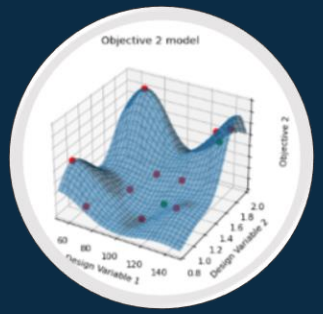


Remember:

the deadline for application is

May 7, 2025, at 5:00 PM ET

More questions:

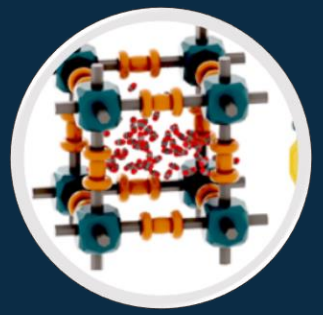


sc.scgsr@science.doe.gov

DOE-SCGSR@ORAU.org

and **office hours** every Friday 3:00-4:00 pm ET at

https://www.zoomgov.com/j/16091335804



After the panels in the breakout sessions please come back to fill the feedback poll!

All these slides will be available at the SCGSR website