BAA HR001124S0010
Exponentiating Mathematics (expMath)

Frequently Asked Questions (FAQ)

As of April 23, 2025

29. **Q:** How important is it that tools be designed for human-in-the-loop vs fully automated?

A: TA2 evaluations will focus on fully automated systems.

28. **Q:** I'd like to know your preference regarding the ambition of the proposal. Is it more important that the proposed project is feasible and has a clear path forward or that it is ambitious?

A: Feasibility is a metric that proposals will be evaluated on. The proposal should be both.

27. **Q:** Your CMO explicitly discouraged FFRDCs from proposing. What are our chances of meeting the minimum requirements for an exception? Would it be worth us submitting an abstract? We have ORNL-unique capabilities we could bring to bear on the topic and world-class experience in specific application areas such as quantum, symbolic mathematics, and software correctness with Rust and other tools.

A: UARCs and FFRDCs interested in this solicitation, either as a prime or a subcontractor, must contact the Agency Point of Contact (POC) listed in the Overview section prior to the proposal (or abstract) due date to discuss potential participation as part of the government team or eligibility as a technical performer.

26. **Q:** When we examine LLM for abstraction for math problem solving, are we looking for white-box approaches or developing a better version of current LLM that can solve math problems without substantial grounding?

A: Please refer to the BAA on release.

25. **Q:** Are you interested in the impact this will have beyond mathematics, into applications in science, tech, eng., bus., software, etc.?

A: This program focuses on pure math.

24. **Q:** How large is the expected team? Couple of researchers or multi-institutional?

A: Teams should be organized to optimally deliver innovative, achievable, feasible, and complete solutions. We will consider teams of varying sizes.

23. **Q:** How much/how early in the program (if any) is HSR expected from TA1 performers?

A: HSR is necessary to meet the speed metric; the sooner the better, ideally within one year.

22. **Q:** Do we make a proposal for both decomp+auto(in)formalization? Or just one of these (TA1)? Or an option for either?

A: Partial solutions may be considered for TA1 if they are exceptional. But proposals should address all requirements of the TA.

21. **Q:** You stated that evaluations are desired for performance on professional-level math. How broadly defined is this? e.g. Applied math, stats, math phys?

A: Pure math (proof-based).

20. **Q:** Is any budgeting info provided? Approx. costs and how many teams funded?

A: No, budgets should be commensurate with the scale of the effort, if one is concerned, one should align budgets and tasks closely.

19. **Q:** Will there be datasets provided for training and validation?

A: TA1 must get their own data for training and internal evaluation, TA2 will evaluate TA1 approaches based on their own data.

18. **Q:** What is the role of conjecture formation in expMath?

A: Please refer to the proposer's day video.

17. **Q:** Will applications to other domains such as software verification be considered for evaluation of program techniques? As part of proposal evaluation?

A: No.

16. **Q:** Besides PIs and co-PIs as main contributors to the project, can we include consultants who do not take big budgets but can be helpful in providing insights throughout the project? If so, what is the formal role in the DARPA contract?

A: Yes. The formal role would be consultants, and the associated proposed cost will be evaluated as an other direct cost (ODC).

15. **Q:** For TA2, is it more emphasized on formal mathematical background than AI?

A: Please refer to the requirements for TA2 in the BAA on release.

14. **Q:** How important is preliminary work in the space of AI + math? For example, if someone is an expert in AI and reasoning, but not too much prior work in AI for math.

A: We encourage you to build a team with expertise in both areas to address the BAA.

13. **Q:** Is prior work or experience, evidenced by research papers or products, on AI for math proofs required, or taken as an advantage for the proposal?

A: Proposals will be evaluated in accordance with the BAA evaluation criteria.

12. **Q:** Are multiple TA2 awards planned?

A: No specific number of TA2 awards is anticipated.

11. **Q:** Is there a planned down select?

A: There is no planned down select.

10. **Q:** Are there any restrictions on the types or families of AI systems that can be used (e.g., DeepSeek)?

A: Diverse families of AI systems may be used.

9. **Q:** Should proposers choose specific classes or domains of math problems to address, or will they be supplied by the program, or should solutions be directed to apply to any (professional level) problem?

A: Propose whatever innovative solution you think is necessary.

8. **Q:** Is studying the collaborative dynamics between the human subjects (mathematicians) and the AI system(s) in scope?

A: We are not studying collaborative dynamics. HSR is relevant for validating that AI is faster than humans.

7. **Q:** Should we include HSR to validate the results of our solutions? If so, should such human subjects be professional mathematicians?

A: DARPA expects HSR for the TA2 evaluations. Human subjects should be at least at the level of math graduate students or above.

6. **Q:** Are you expecting to make grants to successful univ applicants or will it be cooperative agreements?

If the latter, can you please provide additional information about the information needed regarding project personnel?

A: Grants are not an approved award instrument. Please refer to the BAA Overview Information section for the available types of award instruments.

5. **Q:** Do you foresee the use of Human-studies or are you looking for mostly automated evaluation?

A: HSR is expected only to help validate how AI is faster than humans.

4. **Q:** Do you want something aimed at mathematicians only, or are theoreticians in other fields a target audience, from fields such as physics, theoretical CS, etc?

A: The program focuses on pure mathematics.

3. **Q:** In our case we have a collaborator at a national lab who is an expert in an important part of the program/our solution. Is it possible to have that person involved with a small subaward from our institution (in this case academic institution).

A: The structure of proposals should be in accordance with the BAA instructions.

2. **Q:** Does the program address new math to prove performance of the compilers?

A: The program is not focused on compilers.

1. **Q:** Will expMath support systems that dynamically generate abstraction hierarchies not based in ZFC or traditional well-founded set theory—such as non-linear ordinal structures or recursion-friendly meta-models?

A: The right way to get an answer to this kind of question is to submit an abstract. We encourage your most creative, innovative approach to solving the expMath problem.