

## Grant Applications from Universities and Other Research Institutions for Collaborative Research on the DIII-D National Fusion Facility

**Initial Contact with FES:** Prior to submission of an application for a new, renewal, or supplemental financial assistance award for research on the DIII-D facility, potential applicants are encouraged to contact the FES program manager [Matthew Lanctot](#).

**Pre-application:** Based on your interaction with the FES program manager, potential applicants may be encouraged to submit a pre-application, which will be reviewed by FES to establish whether the proposed research fits within the DIII-D program. Based on the review of the proposed research within the pre-application, the applicant will be either encouraged or discouraged to submit an application. Pre-applications should be submitted in PAMS ([link](#)) to the Continuation of Solicitation for the Office of Science Financial Assistance Program ([link](#)) under the Advanced Tokamak program area for FES. The solicitation document available on the FES Funding Opportunities web page ([link](#)) provides guidance on the recommended structure of the preapplication. The provided information will be used to begin planning for the application peer review process.

**Application Content and Forms:** The recommended application content can be found in the documentation available online for the Continuation of Solicitation for the Office of Science Financial Assistance Program ([link](#)). Because DIII-D is a coordinated national program, all applicants must work with researchers from other institutions who are part of the DIII-D National Research Team. The team currently includes researchers from General Atomics, U.S. universities, several DOE National Laboratories, and international collaborators. Planning coordinated research on DIII-D must begin in advance of submitting an application. To be considered for funding, applicants must have discussed their proposed research with the DIII-D Program Leaders early in the application process and must include a signed Record of Discussion (RoD) in the application. The RoD form is used to highlight the benefits of the proposed research to the planned DIII-D research program, identify any interface support required by the proposed collaborative work (if applicable), and describe how the proposed work will be integrated into the overall DIII-D program. The form can be downloaded from this [link](#). To ensure that the proposed activities can be completed during the proposed project period, the RoD should be as specific as possible and include an itemized list of any known expenses that the applicant expects would be supplied by the DIII-D program. Potential items include engineering, design, supporting infrastructure, port access, port hardware, data acquisition, computing resources, and plasma control system support.

**Collaborative Applications:** Teams of multiple institutions may submit collaborative applications. This is the recommended approach for requesting funds from other Office of Science programs to complement experimental research on DIII-D. Before submitting a new proposal that would request support from either program offices or separate FES subprograms, consultation with the relevant program managers should take place. See the solicitation documentation for details on how to submit the applications. Although only the lead institution needs to submit a pre-application, the pre-application should include information for all of the proposed collaborating institutions in order to facilitate the peer review process.

**Timing of application submission:** There are no submission deadlines for all Office of Science programs under the Continuation of Solicitation for the Office of Science Financial Assistance Program. Applications may be submitted at any time. However, if funding is desired during the current fiscal year, we recommend that pre-applications be submitted before **November 15<sup>th</sup>** and applications be submitted before **January 31<sup>st</sup>**. All grants that are funded by FES undergo external peer review based on procedures set down in 10 CFR Part 605. The recommended schedule allows sufficient time for the review of applications by a panel of expert evaluators, the making of funding decisions, and the processing of financial assistance awards. For applications received after **January 31<sup>st</sup>**, there may not be sufficient time to make an award before the end of the fiscal year.

**Electronic submission:** Applications must be submitted electronically via Grants.gov. Information on electronic submission is available at the Office of Science Grants and Contracts web site ([link](#)).

**Typical term of support:** The usual term for a new award is three years, divided into one-year budget periods. Start dates are typically in July or August.

**Anticipated Number of Awards and Award Sizes:** The award size will depend on the number of meritorious applications and the availability of appropriated funds. In FY 2019, ten, three-year awards were funded at an average annual award size of \$500,000.

**Budget:** In preparing an itemized budget for each year and the cumulative budget, the total budget for each year shall sum to the nearest thousands of dollars. A revised budget will be requested if this requirement is not met. Each major item on each DOE budget sheet should be justified in the "Budget Justification" attachment. Permanent equipment costs, travel costs, and direct costs must be explained. For Materials and Supplies, the budget should indicate the general types of expendable materials and supplies required with their estimated costs. The breakdown shall be more detailed when the cost is substantial (> \$5,000). Indirect rates should be consistent with any approved rate agreement that covers the proposed project period. Applicants are cautioned against assuming significant expenses will be supplied by the DIII-D program unless this information is documented in the Record of Discussion.

### Programmatic Areas

The DIII-D user facility at General Atomics in San Diego, California is the largest magnetic fusion research experiment in the U.S. It can magnetically confine plasmas at temperatures relevant to burning plasma conditions. Its extensive set of advanced diagnostic systems and extraordinary flexibility to explore

various operating regimes make it a world-leading tokamak research facility. The DIII-D research goal is to establish the broad scientific basis to optimize the tokamak approach to magnetic confinement fusion. General program information may be found at the following links on the facility web site and links:

<https://fusion.gat.com/global/diii-d/opportunity>

[https://fusion.gat.com/global/DIII-DOpps/FOA/DIII-D\\_Research\\_Overview.pdf](https://fusion.gat.com/global/DIII-DOpps/FOA/DIII-D_Research_Overview.pdf)

[https://fusion.gat.com/global/DIII-DOpps/FOA/DIII-D\\_Program\\_Plans.pdf](https://fusion.gat.com/global/DIII-DOpps/FOA/DIII-D_Program_Plans.pdf)

#### Areas of Emphasis for Applications Submitted during FY 2021:

Proposals addressing all aspects of the DIII-D Five-Year Plan are invited. Applicants are especially encouraged to submit proposals in the following areas.

- Data science, artificial intelligence, and machine learning: The proposed research should aim at developing more efficient and robust solutions as compared to methods presently deployed on DIII-D. Applicants should propose to use AI-enabled analytics and technology to improve operational efficiencies of scientific user facilities, and to address challenges in fusion energy science, particularly in the area of disruption avoidance.
- Simultaneous measurements of plasma turbulent fluctuations for particle, heat, and momentum fluxes at both long and short wavelengths: The measurements should allow DIII-D to understand confinement optimization in both the high-current ITER baseline regime and the advanced tokamak, steady-state regime that is favored for a fusion pilot plant.
- Improved diagnostics and modeling to understand divertor detachment physics: The proposed research should aim to identify, diagnose and model scenarios with adequate power and particle exhaust, leading to quantitative, predictive capabilities in such areas as neutrals, cross-field drifts, transport and turbulence, and divertor interaction with the pedestal, especially interrogating physics processes essential for ITER and a fusion pilot plant.
- Disruptive mode dynamics and mitigation: The proposed research should aim at elucidating the physics of disruptive plasma states and developing disruption mitigation and runaway electron avoidance methods relevant to burning plasmas.

**Frontier Science:** Grant applications aimed solely at carrying out frontier plasma science experiments on the DIII-D facility should not be submitted to this solicitation. Applicants seeking further guidance are encouraged to contact [Nirmol Podder](mailto:nirmol.podder@science.doe.gov) (nirmol.podder@science.doe.gov), the FES program manager of the General Plasma Science area.