GA–A24261

DIII–D YEAR 2003 EXPERIMENT PLAN

by
DIII–D RESEARCH TEAM

MARCH 2003

FOREWORD

This document presents the planned experimental activities for the DIII–D National Tokamak Facility for the calendar year 2003. This plan is part of a five-year contract between General Atomics and the Department of Energy. The Experiment Plan advances on the objectives described in the DIII–D Tokamak Long Range Plan (GA–A23607). The Experiment Plan is developed yearly by the DIII–D Research Council and approved by DOE. DIII–D research progress is reviewed quarterly against this plan. The 2003 plan is based on a $52.3M DIII–D program funding for FY03, with $41.7M to GA, which allows for 13 weeks of tokamak operations. Other major collaborators include PPPL ($4.1M) LLNL ($3.0M), and ORNL ($2.2M). Funding of university collaborators are provided by DOE grants and GA subcontracts. DOE funding by Continuing Resolution for the first half of FY03 has had a major impact upon the planning process for this year. The resultant lengthy period of final budget uncertainty led to the preparation of run plans for both 13 and 19 weeks of operation, and both are described herein. Should funding beyond the 13 week requirement become available, then DIII-D is still in position to execute the 19 week run plan in FY03. In the event of other significant budgetary, technical, or programmatic changes this plan will be revised as necessary.

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1. SYNOPSIS OF THE 2003 DIII–D RESEARCH PLAN

The research campaign for 2003 has been organized into six research thrusts and the ongoing four Topical Science Areas. Approximately 60% of the experimental time has been allocated to the research thrusts, since these activities are aimed directly at critical objectives for the DIII–D Program and for the tokamak research program generally. Two of these thrusts are defined as “major thrusts” and are allocated approximately 1/3 of the overall run time. These are the Advanced Tokamak (AT) scenario thrust and the resistive wall mode (RWM) control thrust. The other four thrusts are targeted at specific issues and have more limited time allocation. Additional experimental time in the topical areas maintains the breadth and scientific depth of the DIII–D Program. Below we convey the essential content of the various research thrust and topical science experiments and their goals and anticipated and hoped for results. The research described has been allocated to 53 run days out of a possible 65 run days, with 12 days of contingency, for the 13 week run plan. The option for a 19 week run plan allocates 76 run days of a possible 95, with 19 for contingency. Additional detailed information can be found on the web, and related links: http://fusion.gat.com/exp/2003/.

The experiment plan was put together with input and prioritization by the year 2003 Research Council. Based on the “DIII–D Five-Year Program Plan 1999–2003,” August 1998, GA–A22950, the Research Council develops a three-year plan which is annually updated. The first of these three year plans was made in 1999. Progress on the research thrusts and topical areas in the 2002 experiment campaign was reviewed at the Year End Review (http://fusion.gat.com/exp/2003/review.html, also broadcast on the internet) 31 July – 02 August, 2002. With input from that review and considering the three-year objectives, year 2003 research thrusts were identified.

A call for experimental research proposals towards those objectives was issued and over 400 proposals were presented at a community-wide Research Opportunities Forum (ROF) on 4–6 December, 2002, which was broadcast on the internet. This year a significant modification was made to the ROF process in that extra effort was made to capture ideas and proposals from ongoing and potential U.S. and international collaborators. Additionally, DIII-D was an active participant in the International Tokamak Physics Activity (ITPA) process conducted in the fall of 2002, through which a number of joint international experiments were identified as high priority for the development of a database for burning plasma research. As a result of both these initiatives, we received 46 proposals came in from foreign laboratories. There were video conference, or at least telephone presentations, of the majority of these from outside the U.S. There were also video conference blocks of time for proposals from Princeton Plasma Physics Laboratory (PPPL), Massachusetts Institute of Technology (MIT), and Oak Ridge National Laboratory (ORNL). All 2003 proposals can be viewed on the internet at http://d3dnff.gat.com/diiid_2003_research_opportunity/. The various thrust and topical science area (TSA) groups prioritized, combined, and otherwise sifted these ideas. The plans so arrived at were presented to the Research Council in December and the advice of the Research Council was used to set the final allocations of run time for the year 2003 campaign.

DIII–D continues to have a large research backlog as shown in Table 1. A very good measure of this backlog is obtained from the run day requests from the research groups for the 19 week option. The total requested by all of the thrusts and TSAs is 138 days for 19 week operation. These 138 days are made up of experiments carefully considered, culled, combined, and optimized by run time from the total ROF submission list. All are high priority experiments. A 35-week run plan would be needed to reasonably expect to execute this 138 days of high priority experiments, that is, requiring nearly 3 years at a rate of 13 weeks per year, or nearly two years at 19 weeks per year.

Table 1
Accounting of Run Day Requests for the 2003 Campaign

	Days Requested		Days Allocated		
Area	13 Week	19 Week	13 Week	19 Week	Proposals Received
Stability TSA	7	11	5	8	52
Boundary TSA	10	20	6	9	63
Confinement TSA	15	22	8	12	70
H&CD TSA	6	11	4	6	26
T1 edge pedestal	5	7	4	5	52
T3 NTM	5	7	3	4	13
T4 RWM	16	24	9	12	53
T8 AT scenarios	14	20	9	12	44
T9 QH	5	7	3	4	36
T10 Hybrid	4.5	8.5	2	4	20
Totals	87.5	137.5	53	76	429

The 2003 experiment plan, summarized in Table 2, consists of efforts in six thrust areas and four topical areas. There are two major thrusts (4,8) and four minor thrusts (1,3,9,10).

- Thrust #1 edge pedestal (4/5-days, in the 13/19 week plan)

  Thrust #1 has responsibility for new measurements to be made with the lithium-beam edge current diagnostic. This effort will include high priority ITPA JET/DIII-D experiments, and also place a high priority upon investigating the effects of stochastic magnetic perturbations on the plasma edge, using the newly installed I-coil. Preliminary work on the stochastic boundary will be done in piggyback mode.

Table 2
Run Time Allocations for the 2003 Experiment Campaign

#	Acronym	Description	13 wk Plan (Days)	9 wk Plan (Days)	Area Leaders
1	Edge pedestal	Determine the pedestal height and ELM size dependence on plasma parameters and atomic physics	4	5	**M. Fenstermacher** P. Snyder
3	NTM	Optimize ECCD feedback stabilization schemes to increase beta	3	4	**R. LaHaye** D. Humphreys
4	RWM	Advance the physics understanding of resistive wall mode stabilization and validate effectiveness of internal coils	9	12	**M. Okabayashi** A. Garofalo G. Jackson
8	AT scenario	Continue high beta full noninductive scenario development with new tools	9	12	**C. Greenfield** J. Ferron
9	QH–mode	Develop an understanding of the QH–mode for ELM-free scenario projection to burning plasmas	3	4	**P. West** D. Doyle
10	Hybrid scenarios	Integrated, long-pulse scenario development for burning plasmas	2	4	**M. Wade**
		Thrust totals	30	41	
		Stability topical area	5	8	**E. Strait**
		Confinement topical area	8	12	**K. Burrell**
		Boundary topical area	6	9	**S. Allen**
		Heating and current drive topical area	4	6	**R. Prater**
		Total allocated days	53	76	
		Contingency	12	19	
		Available days	65	97	

- Thrust #3 NTM (3/4-days)

  The focus will be strongly upon feedback optimization for suppression of NTMs and for commensurately achieving increased beta.

- Thrust #4 RWM (9/12-days)

  This thrust must complete the work necessary for the level 1 milestone completion: *Conduct a first set of experiments demonstrating the effectiveness of the new internal coil set in controlling plasma instabilities, and compare the results with theoretical predictions*. Commissioning of the coil and diagnostics are expected to take place during pre-physics startup operations. Error field correction work with the I-coil will be coordinated with similar work in the stability TSA. Experiments will include active feedback development and exploration of higher β_N with rotation and/or feedback.

- Thrust #8 advanced scenario development (9/12-days)

  Continued development of 100% non-inductive discharges using greater EC power and increased operating reliability at higher beta is the highest priority.

- Thrust #9 QH–mode (3/4-days); a new thrust for 2003

  The primary goal is to conduct an "informed" parameter scan in order to broaden the range over which the QH–mode can be achieved in DIII–D, given the potential value of such an ELM-free mode for reactor application.

- Thrust #10 hybrid scenarios (2/4-days); a new thrust for 2003

  The focus of this effort is upon developing integrated long pulse scenarios for ITER (or FIRE). Experiments that are most relevant with respect to the ITPA coordinated efforts will have high priority.

- Topical science areas

  Stability Topical Area (5/8 days). In addition to advancing basic MHD physics and stability control, this area will continue to take responsibility for the development of general plasma control. Error field experiments will be coordinated with Thrust 4 (with a focus upon high toroidal rotation).

  Confinement Topical Area (8/12 days). The overarching goal for this area is to develop a predictive understanding of transport. A large number of well-formulated experimental proposals were submitted to the five subgroups. The limited number of run days available this year required that these be severely reduced and combined into the nominal eight days allocated.

  Boundary Topical Area (6/9 days). Many good experiments are proposed in five subgroups. The larger effort should be in the Impurities and PSI group that is more focused on the longer-range goal of mass transport.

Heating and Current Drive Topical Area (4/6 days). It is the highest priority of the heating and current drive area to commission the EC systems with plasma, for use in so many of the other planned experiments for this year. Additionally, important experiments will be conducted on ECCD far off axis.

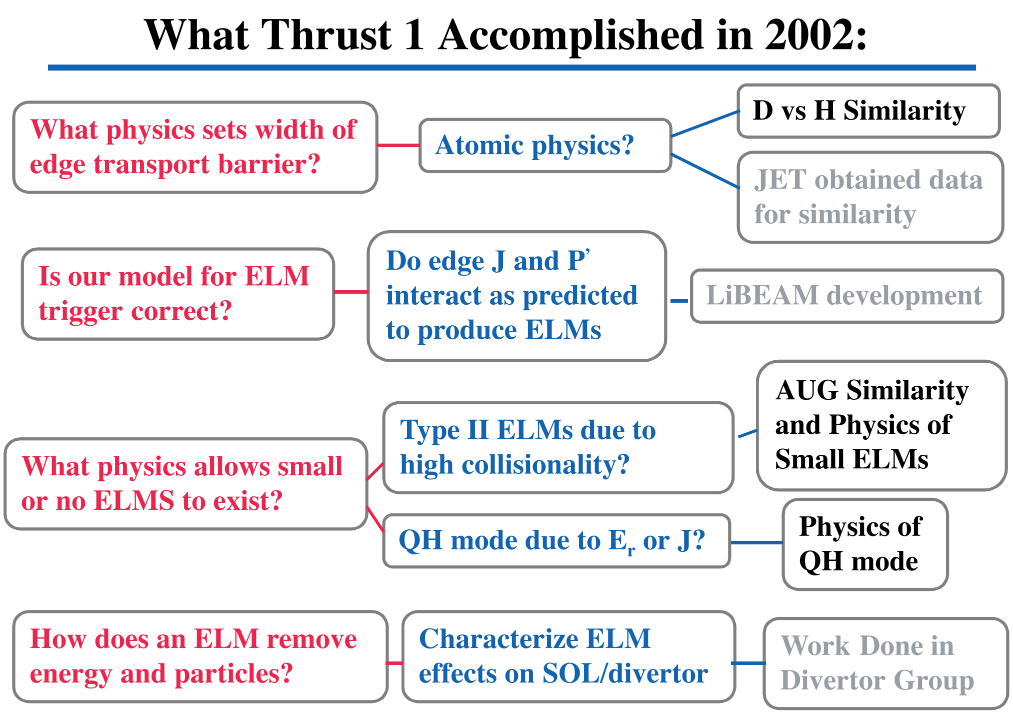
Each of the efforts has a responsible leader and deputy leaders. A brief synopsis of progress in the various thrusts in 2002 followed by year 2003 plans is given below.

1.1. RESEARCH THRUSTS FOR 2003

1.1.1. RESEARCH THRUST 1, H–MODE PEDESTAL AND ELMS (Leader: M.E. Fenstermacher, Deputy: P.B. Snyder)

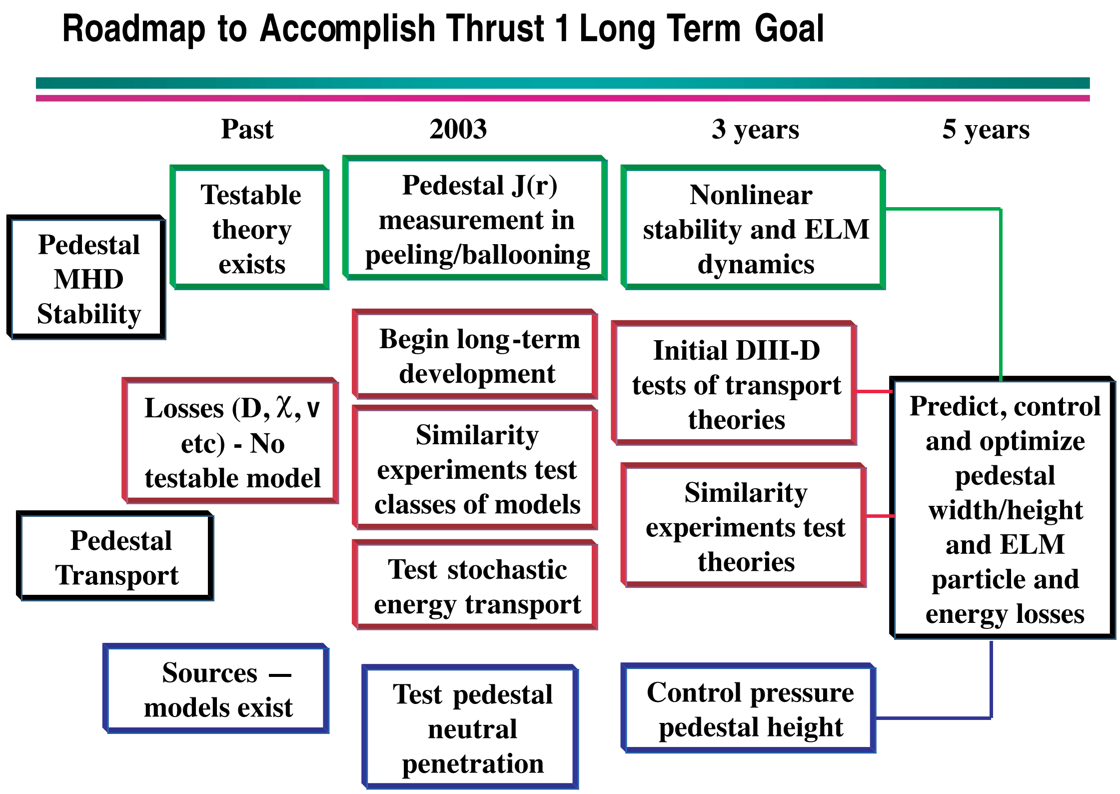
Thrust 1 for the 2003 run campaign seeks to: (1) verify that our understanding of pedestal stability limits explains the destabilization of Type-I ELMs when measured edge current density profiles are included in the model, (2) verify that our models of edge bootstrap contribution to the total edge current density profile are consistent, and (3) make progress in understanding the scaling of pedestal width and height through multi-machine dimensionless scaling experiments.

The summary of the scope and accomplishments of Thrust 1 in 2002 is given below (as summarized by R.J. Groebner in the 2002 Year End Review). Dark highlighted items in the right column are 2002 Thrust 1 experiments on DIII-D that addressed the physics questions in blue. Grey highlighted topics indicate progress outside Thrust 1 toward future experiments to further address questions in blue.



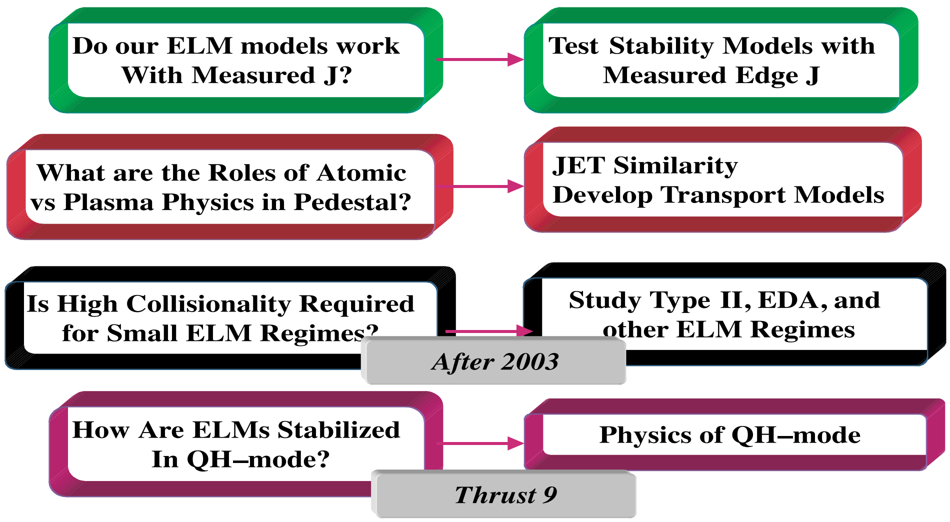
1.1.1.1. Strategy for Thrust 1 Plan in 2003.

The long term plan of Thrust 1 (see below) is to combine a complete understanding of pedestal MHD stability limits with pedestal transport models to allow predictions of ELM destabilization thresholds and pedestal width/height scaling for future devices.



In 2003, measured edge current profiles will be included in the existing model of pedestal/ELM stability limits and comparisons of predicted vs. measured ELM thresholds will be used to test the model. In the transport area there is no testable model for pedestal transport so the focus in 2003 will be to stimulate development of such a model with help form the theory community. Experimental work in 2003 in this area will focus on multi-machine comparisons of pedestal width/height in dimensionless scaling experiments as a first step to delineating possible theoretical models from those that do not explain the scaling with machine size. Studies of small ELM regimes such as Type-II and EDA will be done in future years. Studies of the no-ELM regime of QH-mode will be done in the new Thrust 9.

Important 2003 Thrust 1 questions are subset of 2002 list due to limitations on thrust this year



The experimental run proposal for Thrust 1 in 2003 is given below in priority order for a 13-week plan and a 19-week plan. Tests of models that predict the effect of stochasticity induced by the I-coil on pedestal width/height will be made if sufficient run time is available.

13 Week Plan Summary - Priority Order

	13 week	Priority
• Li-beam J(r) dedicated calibration plasmas (Ohmic)	0.5 days	A1
• Test peeling/ballooning model of ELM instability	1.5 days	A2
• Test scaling models of pedestal transport: JET -- DIII-D	1 day	A3
• Test models of stochasticity effect on transport	1.0 days	A4
• Total Dedicated Run Time	4 days	
• Pedestal Density width on neutral penetration	1.0 day	B1
• Pedestal Height/width on heating power	1.0 day	B2
• Piggyback - Li-beam commissioning	(15 x 2 shots)	P1
– Beam into Gas, Calibration shots,Ohmic periods, VH-mode ref before 1st ELM,		

19 Week Plan Summary - Priority Order

	19 week	Priority
• Li-beam j(r) dedicated calibration plasmas (ohmic)	0.5 days	A1
• Test peeling / ballooning model of ELM instability	1.5 days	A2
• Test models of bootstrap component of edge current	1 day	A3
• Test scaling models of pedestal transport: JET -- DIII-D	1 day	A4
• Test models of stochasticity effect on transport	1.0 days	A5
• Total Dedicated Run Time	5 days	
• Pedestal Height/width on heating power	0.5 days	B1
• Piggyback - Li-beam commissioning	(15 x 2 shots)	P1
– Beam into Gas, Calibration shots,Ohmic periods, VH-mode ref before 1st ELM,		

1.1.2. RESEARCH THRUST 3 — ADVANCE THE PHYSICS UNDERSTANDING OF NEOCLASSSICAL TEARING MODES, INCLUDING THE THRESHOLDS AND MEANS OF STABILIZATION (Leader: R.J. La Haye, Deputy: D.A. Humphreys)

1.1.2.1. Optimize Feedback Schemes to Raise Beta While Stabilizing the m/n = 3/2 and 2/1 Modes.

After the ideal resistive wall mode instabilities that are the subject of major Thrust 4, the next largest immediate stability concerns are the neoclassical tearing modes (NTMs). These modes are seen to limit performance in conventional sawteething plasmas (m/n = 3/2 and 2/1), in hybrid scenario plasmas (m/n = 2/1) and have been seen to limit the performance in all our approaches to Advanced Tokamak (AT) plasmas. Even in plasmas in which q_{min} has been raised above 2, NTMs (m/n = 5/2 and/or 3/1) have been observed. The purpose of this minor thrust in 2003 is to optimize feedback schemes to raise beta while stabilizing the m/n = 3/2 and 2/1 modes. It has a limited focus to follow up previous success with electron cyclotron current drive (ECCD). Broader scaling and physics of the NTM is to be pursued with the stability topical science area in 2003.

The stabilization of (3,2) and (2,1) NTM islands at high β and β recovery are an ITPA high priority research area in 2002–2003. A DIII–D milestone (#151) is due in

October 2003: "maintaining high performance by controlling plasma instabilities with microwaves".

Experiments in 2003 are planned to further DIII–D leadership in two areas: (1) using ECCD for higher beta through NTM suppression/avoidance and (2) state-of-the-art active control of ECCD positioning. Improved control algorithms include "target lock" (jitter) search and suppress <u>with</u> an NTM and real-time tracking of the changes of the q-surface location <u>without</u> an NTM.

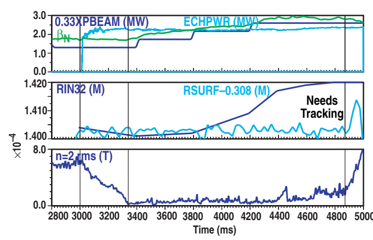
THRUST 3 TIMELINE FOR GYROTRON POWER AND DURATION NEEDS

	2000	2001	2002	2003	2004
#	2	4	5	6	6
Duration	≳1 s	≲2 s	≲2 s	≲2 s	2 ~10 s (3@2, 1@5, 4@10)
3/2 NTM	Marginal for complete suppression	3 adequate for complete suppression	No experiment	4 needed for raising β without NTM or 2 for ST control and 3 for 3/2	>5 s of 6 gyrotrons for complete suppression
2/1 NTM	No experiments	4 gives partial suppression	5 adequate for complete suppression	6 needed for raising β without NTM (from modeling)	>5 s of 6 gyrotrons for complete suppression

2003 THRUST #3 EXPERIMENTS

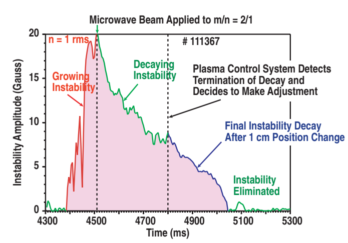
1 day in 13 weeks, Raising beta without 3/2 NTM

- ★ higher B_T/higher I_p so no $3f_{ce}$ in plasma
- ★ improved "Target Lock" ΔR_{surf} search and suppress <u>with</u> NTM
- ★ new active tracking of change in q=3/2 location <u>without</u> NTM



2 days in 13 weeks, Raising beta without 2/1 NTM

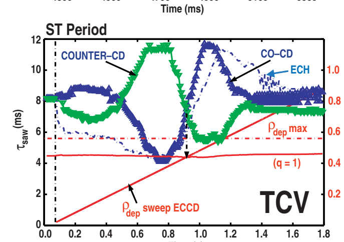
- ★ follow up 2002 success
- ★ new active tracking of change in q=2/1 location
- ★ maintain 2/1 stable beta at or above ideal no wall beta limit



1 day in 19 weeks

Simultaneous control of q=1 sawteeth and 3/2 NTM to raise stable beta

- ★ EC sawteeth control to be demonstrated first in stability TSA
- ★ role of sawteeth on ECCD requirement for NTM suppression
- ★ ΔB_T for q=1 "midplane" and ΔZ_{surf} for q=3/2 "top"
- ★ JET/TCV collaboration, identified by ITPA as important



1.1.3. RESEARCH THRUST 4 — ADVANCE THE THE PHYSICS UNDERSTANDING OF RWM STABILITY, INCLUDING THE DEPENDENCE ON PLASMA ROTATION, WALL/PLASMA DISTANCE, AND ACTIVE FEEDBACK STABILIZATION (Leader: M. Okabayashi, Deputies: A.M. Garofalo, G.L. Jackson)

1.1.3.1. Long-Term Goals of Research Thrust 4.

Background

- The most advanced tokamak regimes (β_N ~ 5 and ~100% bootstrap current drive) will be explored with several steps of hardware upgrades [DIII–D Five Year Plan].
- A high level of external kink (RWM) stabilization is the pre-requisite for physics exploration of these regimes with extremely high plasma performance regimes.

Objectives

- To develop stabilization schemes in a timely manner prior to experimental exploration.
- To develop schemes as robust as possible, considering various possible operational scenarios.
- To improve theoretical understanding of the experiments by developing/ upgrading stability codes.

1.1.3.2. Current Understanding of RWM Stabilization.

- Dynamic stabilization with high plasma rotation has been quite successful for achieving the ideal wall limit.
- The key, to this point, has been the elimination of the resonant residual error field.
- Rotational dissipation hypothesis (proposed by Bondeson/Ward) provides qualitative agreement with experiments. However, discrepancies have been observed in the steady state (RFA). A systematic experimental survey as well as improvements in modeling are needed to further understanding of the dissipation mechanism.

- According to VALEN analysis, it is possible to achieve performance close to the ideal-wall limit even without plasma rotational stabilization, if high enough gain operation is achieved.

1.1.3.3. New Hardware in FY03.

- 12 Internal Coils (I-coil) have been installed at (upper/lower) major radius side, which will provide better matching to the RWM poloidal structure.
- 12 sets of internal sensors have been installed to monitor the radial flux and the poloidal field at the middle of each I-coil segment.
- Upgrade of PCS for fast data sampling rate, new logic capability and filtering non-RWM signals.
- Separation of the resistive wall mode feedback and error correction functions is now possible by combining C-coils with reconfigured C-coil power supply.

1.1.3.4. Run Plans FY03.

- The early run period is focused on fulfilling the level 1 DOE milestone of FY 2003: "Complete installation of internal coils for feedback control of plasma instabilities on DIII-D and conduct a first set of experiments demonstrating the effectiveness of these coils in controlling plasma instabilities, and compare with theoretical predictions."
- The DOE level-1 milestone will be completed with these sub-categories:
  - Initiation of new systems and feedback tool development
  - Higher β_N sustainment with high plasma rotation in broad parameter regime
  - Development of rotation control tools with magnetic braking and ECH
  - Demonstration of direct feedback at plasma rotation below the rotational stabilization threshold and comparison with theoretical predictions.

The sequence is shown below.

1.1.3.5. Plans for Numerical Code Development.

For quantitative comparison of experimental results and theoretical predictions, we will not only utilize the existing codes VALEN CODE and CHU+CHANCE CODE, but also carry out the major upgrade on MARS and NOVA codes. The details are listed in Table 3.

Table 3
Details for Quantitative Comparison of Experimental Results and Theoretical Predictions

Numerical Codes	Experimental Observations
• Low rotation	
VALEN CODE	Feedback performance
CHU+CHANCE CODE	
• High rotation	
MARS upgrade	RWM growth rate and structure Dispersion relation
MARS+PADE approximation	Feedback performance
• Rotation equilibrium and stability	
NOVA-F	RWM growth rate and structure
• Anomalous angular momentum diffusion coefficient with RWM	
ONETWO CODE	Rotation damping
TRANSP analysis	

1.1.4. THRUST 8 — ADVANCED TOKAMAK SCENARIO DEVELOPMENT (Leader: C. Greenfield; Deputy: M. Wade)

1.1.4.1. Goals of the Advanced Scenario Development Thrust.

- The DIII–D Program's primary focus is this Advanced Tokamak (*AT*) thrust that seeks to find the ultimate potential of the tokamak as a magnetic confinement system.
- The Thrust is defined very broadly, and includes elements drawn from all topical science areas and some of the other thrusts. The challenge to Thrust 8 is to integrate all of these diverse results:
  — MHD stability: *AT* regimes are envisioned to operate significantly in excess of the no-wall beta limit.
  — Transport: pressure profile control for consistency with high beta and high bootstrap fraction.
  — Current drive: maximize bootstrap fraction and provide remainder of current through noninductive means. The emphasis is on off-axis ECCD, but fast wave and neutral beams play important roles as well.
  — Boundary: particle control is needed to maximize the current drive efficiency over the eventual 10 second duration of *AT* discharges. For *AT* regimes in next step devices, additional understanding of exhaust control in relatively low density tokamak plasmas is needed as well.

— In addition, there are two major enabling elements for the *AT* research program:
 ⇒ A comprehensive integrated modeling effort supports both the development and interpretation of experiments. In addition, results of comparisons between experiment and simulation will be instrumental in continuing to develop a theory based understanding of all of the important physics.
 ⇒ The flexible DIII–D Plasma Control System will continue to be developed to support integrated operation of a large set of actuators used to control *AT* plasmas.

- Thrust 8 will continue its science based approach toward development of *AT* solutions.
  — Emphasize understanding over performance demonstrations
   ⇒ Demonstrations will serve as tests of the understanding gained.
  — Experimental efforts will be closely coupled with modeling
   ⇒ Development of both experiments and models can drive each other.
  — *The ultimate goal of Thrust 8 is to develop a fully predictive understanding that allows development of steady-state high performance regimes in a burning plasma.*

1.1.4.2. Summary of Thrust 8 Progress in 2002.

- A major accomplishment in 2001 (in Thrust 2) was development of a high performance ($\beta_N \approx 4$, $\beta_N H_{89} > 10$, $f_{BS} = 65\%$, $f_{NI} = 80\%$) *AT* target discharge that issustained for several confinement times. This discharge served as a starting point for efforts in 2002, but was in a shape (high κ and δ double-null divertor) where the density control needed to maximize current drive efficiency was not available.

- Progress in 2002 focused on profile control looking toward steady-state. Highlights include the following:
  — Optimize target q profile for simultaneous high β and high noninductive current fraction.
   ⇒ Evaluate MHD stability at high β and high q
  — Current profile modification with ECCD in two different *AT* regimes.
   ⇒ Discharges with $\beta_N > 3$ and $f_{NI} \approx 90\%$ obtained.
  — Control of kinetic profiles with ECH.
   ⇒ Feedback control of T_e.
   ⇒ Density profile control in QDB regime.

- Key remaining near-term issues
  - We have not yet succeeded in fully integrating the high β results of 2001 with the successful current drive results of 2002. Such integration is expected to result in discharges with $f_{NI} \approx 100\%$ in the near future.

1.1.4.3. Scientific Questions to be Addressed by Thrust 8.

- What limits MHD stability in *AT* plasmas?
  - Pressure profile shape.
  - *q* profile.
  - Plasma shape.
  - *May motivate divertor modification for high triangularity, high elongation double-null pumping configuration*.
- Can fast wave be coupled to an *AT* plasma with large outer gaps?
  - *Need to validate Fast Wave as a viable heating and current drive tool in an AT configuration to justify proceeding with reactivation of the full system*.
- Compatibility of current profile control tools (e.g. ECH/ECCD, FW, …) with transport in fully noninductive discharges.
- Can we adequately control the pressure profile:
  - Near term: in present-day discharges?
  - Longer term: in discharges with nearly 100% bootstrap current?
  - Ultimate question: in a burning plasma?
- Can high performance be accessed with $T_e \approx T_i$?
- Are there other paths to an *AT* that offer more promise? Possible candidates are:
  - Quiescent Double Barrier regime.
  - "Current hole" discharges.
  - VH–mode code with QH–mode edge.

1.1.4.4. The Thrust 8 Program.

- Assigned 9 days in 2003 (12 days if the DIII–D campaign is extended to 19 weeks).
  - Requires us to focus on a limited set of goals.
  - Eliminates (at least for this year) much of the breadth originally included in the thrust.

- Primary focus: produce a 100% noninductively driven discharge with high beta, approaching $\beta_N \approx 4$.
  - — MHD stability. In 2002, we were limited to $\beta_N \leq 3$ when operating with plasma shapes compatible with density control via pumped divertor. We will seek to understand and overcome this stability limit via:
    - ⇒ Modification of the pressure profile shape.
    - ⇒ Variation of the plasma geometry.
      - o *Results of these experiments, as well as extensive calculation effort, are expected to provide a technical justification for the proposed divertor upgrade.*
  - — Current drive and integration. In 2002, we obtained $f_{NI} \approx 90\%$ in discharges with ECCD. Goal for 2003 is $f_{NI} \approx 100\%$.
    - ⇒ Both bootstrap fraction and current drive efficiency will benefit from operation at increased β (see above).
    - ⇒ Continue to use ECCD … system now ready to deliver 4 MW for 2 seconds or 2.5 MW for 4 seconds.
    - ⇒ New tool: begin experiments with $P_{FW} > 1$ MW.
      - o *These experiments will provide technical justification for reactivating the entire 6 MW Fast Wave system.*
    - ⇒ Integrated modeling predicts fully noninductive sustainment with conservative estimates of power degradation.

- Profile control tool development will continue during one day of experiments (two in the extended program) using the Quiescent Double Barrier regime as a steady target.

	9 day	12 day
Demonstrate 100% NI Discharges with increased ECCD and ECH power	5	5.5
Evaluate FW system for use in AT plasmas	1	1
Improved control over current profile	1	1
Continue to develop 100% noninductive current at high β *(INTEGRATION)*	3	3.5
Show β_N≈4 for longer than 2 seconds	3	4
Pressure profile modification	2	3
Boundary shape	1	1
Effect of edge pedestal height and current density on n =1 β limit	0	0
RWM suppression to extend high β	0	0
Explore/evaluate different approaches to AT target	0	0
Current hole	0	0
Other	0	0
Evaluate techniques (tools) to modify and control profiles	1	2
Profile control in QDB	1	2
Other	0	0
Other issues	0	0.5
Divertor physics (piggyback on 100% NI)	0	0.5
High performance with $T_e \approx T_i$ (piggyback - no explicit time allocation)	0	0
Total Thrust 8	9	12

1.1.5. THRUST 9 — QH–MODE UNDERSTANDING AND PROJECTION (Leader: W.P. West; Deputy: E. Doyle)

1.1.5.1. Goals of the QH–Mode Thrust: Develop an Understanding of QH–Mode so that ELM-Free Scenarios can be Achieved in Burning Plasmas.

- Importance: the quiescent H-mode provides a solution to a major issue for fusion reactors: Pulsed divertor heat load due to ELMs
  - — ELM impulsive heat loading is a critical issue for both ITER and FIRE.
  - — Maintenance of a high pedestal pressure is critical for ITER and FIRE.
  - — The fusion community is very interested in extending ELM-free H-mode regimes to show promise for use in future burning plasmas.
- What must we accomplish to achieve our long term goal?
  - — Understand ELM suppression.
  - — Understand the scaling of QH pedestal parameters to larger devices.
  - — Achieve QH at higher density.

1.1.5.2. Summary of Past Work on the QH–Mode

- Thrust 9 is a new thrust, building on past work in Thrusts 1 and 7.
- ELM suppression is seen routinely in counter beam injected discharges with strong divertor pumping and low plasma density.

- Pedestal parameters in QH and counter injected ELMing H-modes are similar.
- An unidentified MHD mode, the edge harmonic oscillation (EHO) is usually present in the counter injected QH discharges, but not always.
- The EHO has been seen in co-injected discharges, but has not lead to ELM free operation.
- A very deep electric field well is observed in the pedestal region of QH-mode.
- ASDEX-Upgrade has also observed QH-mode with an EHO in counter injected discharges.

1.1.5.3. Goals for 2003.

- Measure and expand the QH-mode operating space.
  — Higher density ($n_e^{ped} \leq 4 \times 10^{19}$ m^{-3} to date) (One day).
  — Broader range of current, toroidal field and safety factor q (One day).
  — QH-mode in co-injected discharges (One day).
- Continue investigation of key question: Why do the ELMs go away?
  — Investigate effects of edge E_r and edge j(r) :*Need lithium beam* (Two days).
  — What is the EHO?
  — Work with Thrust 1 on understanding the onset of edge instabilities.

1.1.6. THRUST 10 — INTEGRATED, LONG-PULSE SCENARIO DEVELOPMENT FOR BURNING PLASMAS (Leader: M.R. Wade)

This is a new thrust established for 2003.

The long-term goal of Thrust 10 is to develop and assess the viability of robust, stationary plasma scenarios that offer significant normalized performance advantage over conventional, ELMing H-mode discharges. Demonstration of such a scenario would allow next-step burning devices to achieve their desired fusion performance while operating well away from the engineering limits of the device.

The near-term goal of Thrust 10 is to evaluate the operating space and assess the viability of stationary, high performance discharges developed on DIII-D in recent years. In particular, experiments will emphasize expanding the range in density and q_{95} in which these discharges can be achieved. In addition, comparisons will be made between these discharges and similar scenarios developed on ASDEX-Upgrade, JT-60U, and JET.

1.1.6.1. Experimental Plan for 2003.

- 13-week Plan
  - — Both days devoted to "Map the Existence Domain of the Hybrid Scenario."
- 19-week Plan
  - — 1 day: Sustainment using ECCD.
  - — 1 day: Operation above the no-wall beta limit.

1.2. PHYSICS TOPICAL AREAS

1.2.1. STABILITY (Leader: E.J. Strait)

1.2.1.1. Goals.

The long-term objective of MHD stability research in DIII-D is to establish the scientific basis for understanding and predicting limits to macroscopic stability of toroidal plasmas. In addition to the more focused research carried out in the Research Thrusts, the role of the Stability Topical Science area is to provide a broad range of good MHD stability science, investigate instability control in regimes relevant to burning plasmas, and explore stability physics in new regimes beyond the scope of the advanced tokamak program.

1.2.1.2. Progress in 2002.

In 2002, 3 days were allocated to Stability Topical Science experiments, of which 1.5 were completed.

- A half-day session on disruption mitigation successfully tested an algorithm for triggering the gas jet, based on detection of loss of vertical position (the position control was deliberately disabled). Making the threshold for real-time detection and triggering more sensitive led to earlier detection, with greater radiated energy and reduced halo currents during the disruption.
- A similarity experiment with NSTX on fast-ion instabilities showed that plasmas could be matched well between the machines, with DIII-D operating at the low end of its toroidal field range (0.52 Tesla). The toroidal mode number for TAE modes was observed to be higher in DIII-D than in NSTX, in agreement with theory; further analysis should allow comparison of the stability thresholds.

- An experiment on ECCD stabilization of sawteeth was planned but not carried out.

1.2.1.3. Plans for 2003.

This year, 52 proposals were received in a broad range of topics:

Sawtooth physics
Disruptions and mitigation
Tearing mode physics
Error fields
Advanced plasma control
Fast ion instabilities
High performance regimes

Within the time constraints of the overall DIII-D operating schedule, the proposed plan addresses the most important topics in both basic MHD physics and stability control for AT and burning plasmas. The plan is summarized in the list below, with further details following it.

STABILITY TOPICAL SCIENCE EXPERIMENTS	13 Weeks	19 Weeks
Sawtooth physics	1	1
Disruption mitigation: physics of gas jet penetration	1	1
NTM threshold with cross-machine scaling	1	1
Error field effects	1	1
Sawtooth control by ECCD	1	1
Alfvén similarity experiment with NSTX		1
Advanced shape control (MIMO control development)		1
Stability of current hole plasmas		1
TOTAL DAYS:	5	8

1.2.1.3.1. 13-Week Plan. Under a 13-week operating schedule, 5 days have been allocated to the Stability Topical Science area. This time will be used for experiments in sawtooth physics, disruption mitigation, neoclassical tearing mode physics, error fields, and sawtooth stabilization.

1. **Sawtooth Physics.** (30) E. Lazarus, the sawtooth in bean and oval shapes". Purpose: investigate basic sawtooth physics, including the role of interchange modes and the internal kink mode, by varying the shape of the internal flux surfaces. This is a continuation of an experiment from 2001, when significant differences were seen in sawteeth with bean and oval plasma shapes. This year's experiment will take advantage of upgraded CER and ECE diagnostics.

2. **Disruption Mitigation — Physics of Gas Jet Penetration.**

   Purpose: verify the mechanism for penetration of a high-pressure gas jet into the plasma. A validated model is needed for extrapolation to burning plasmas. The experiment will vary the plasma density, toroidal field, and gas jet pressure for comparison with modeling. A new tool for this experiment is a gated camera at the midplane for imaging of the gas jet. This is an ITPA high priority topic, and coordination with JET experiments will yield data on size scaling of the gas jet penetration.

3. **Neoclassical Tearing Mode Threshold With Cross-Machine Scaling.**

   Purpose: distinguish between models for NTM threshold (cross-island transport vs. polarization current). This experiment looks at the mode as it turns off during a beta rampdown in order to avoid the seeding effects of other instabilities. If time permits, the effects of rotation and error fields will also be included. This is a continuation of a joint experiment with JET and AUG, begun in 2002, and is an ITPA high priority topic.

4. **Error Field Effects.**

   Purpose: (a) determine plasma's resonant and sideband response to error fields. This part of the experiment will use the I-coil to vary the poloidal harmonics of error field, and determine the dependency of the threshold for 2/1 locked modes at low density. It is a joint experiment with JET. (b) investigate the difference between measured error fields and our previous empirically optimized correction. Here we will apply an error correction with the C- and/or I-coil that is based on the error field measurements of 2001. The correction will be optimized about this operating point, and compared with the previous empirically determined correction. This experiment is to be coordinated with error field experiments in Thrust 4.

5. **Sawtooth Control by ECCD.**

   Purpose: test the role of magnetic shear at the q=1 surface in triggering sawteeth, and demonstrate sawtooth suppression or small, benign sawteeth. The ECCD resonance will be scanned across the q=1 radius with co, counter, and radial launch, in order to characterize the effects on the current profile evolution and sawtooth crash. Data will be used for comparison with the Porcelli sawtooth model. If time permits, the effect of sawtooth modification on NTM onset will be investigated, an ITPA high priority topic. This experiment will be coordinated with NTM control experiments in Thrust 4.

1.2.1.3.2. 19-Week Plan. Under a 19-week operating schedule, a total of 8 days have been allocated to the Stability Topical Science area. The additional three days will be used for experiments in fast ion instabilities, development of advanced shape control, and exploration of "current hole" plasmas.

1. **Alfvén Similarity Experiment With NSTX.**

   Purpose: validate the predicted aspect ratio dependence of the Alfvén mode spectrum and eigenfunction. All of the key parameters except aspect ratio are matched between the two machines, including shape, toroidal field, beam energy, and consequently the ratio of fast ion speed to Alfvén speed. This is a continuation of an experiment from 2002, and investigates a critical physics issue for next-step devices.

2. **Advanced Shape Control (MIMO Control Development).**

   Purpose: develop precise, stable plasma shape control with a multiple input/multiple output (MIMO) control system. Multivariable control is a key to improving the reliability and flexibility of DIII-D operation. This experiment will develop double-null shape control, building on previous successful tests of a MIMO single-null controller. If time permits, algorithms for graceful avoidance of coil current saturation will be tested.

3. **Stability of Current Hole Plasmas.**

   Purpose: first exploration of stability limits in the new regime of "current hole" plasmas. Beta limits will be tested with and without RWM feedback control. This experiment is to be coordinated with related experiments in Thrust 8.

1.2.2. CONFINEMENT AND TRANSPORT — (Leader: K.H. Burrell)

1.2.2.1. Three Year Goals for Confinement and Transport.

Core Transport.

- Develop improved physics understanding and control of reduced core transport regions (connection to Thrust 8).
  - — Develop and exploit new tools for controlling core transport: pellet injection, impurity injection, counter neutral beam injection, co- and counter-ECCD.
  - — Broaden tests of the ExB versus γ_{MAX} comparison by using new tools to investigate effect of T_i/T_e ratio, impurities, density peaking, magnetic shear, α (Shafranov shift) stabilization.

  - Increase emphasis on understanding electron transport and angular momentum transport.

- Investigate fundamental nature of turbulent transport.
  - Can we identify features in the data which are unique to the fundamental theoretical microturbulence modes (e.g., ITG, ETG, TEM)?
  - Compare measured turbulence characteristics with gyrokinetic and gyrofluid code predictions.
  - Test predictions about zonal flows?

- Carry out innovative experiments to make quantitative tests of predictions of (theory-based) transport models

- Utilize nondimensional scaling approach to further elucidate tokamak transport
  - ρ_* scaling to next step devices

Edge Physics.

- Study H-mode pedestal and investigate key physics controlling edge gradients and pedestal values.
  - Pedestal issues are the focus of Thrust 1.

- Test theories of edge and divertor conditions needed to get H-mode
  - Encourage detailed comparison of edge modeling (e.g., Janeschitz, Xu) with experimental results.
  - Determine if plasma parameters alone govern threshold or whether atomic physics (e.g., neutrals) is also important.

- Investigate fundamental nature of L to H and H to L transitions
  - Role of electron versus ion heat flux.
  - Detailed transition dynamics (predator-prey).

Modeling.

- Develop modeling capability in parallel with experimental tests.
  - Further development of theory-based turbulent transport models is essential.
    - ★ Address particle, angular momentum and electron thermal transport.
  - Further development is needed so that edge and core turbulence codes can calculate what experimental diagnostics actually measure.
  - Utilize codes to guide experimentalists in designing key tests of theory.

1.2.2.2. Confinement and Transport Experiments in 2002 by Subarea.

Fundamental Turbulence Studies.

- Search for zonal flows (G.R. McKee), Experiment No. 2002-22-01. Results:
  - — Coherent poloidal flow oscillation clearly observed in the turbulence flow field. The spatial features were characterized.
  - — The mode frequency scales as the (sound speed)/R, suggesting this is a geodesic acoustic mode, often observed in simulations of edge turbulence

H-Mode Physics.

- Role of electron versus ion physics in the H–mode transition (D.M. Thomas, T.C. Luce), Experiment No. 2002-22-02. Results:
  - — The threshold power for ECH and NBI H-modes were measured during a density scan.
  - — The required EC power is more than twice the NBI power at the lowest density.
  - — Only core ECH was used. Yet to test is edge ECH.

Test of (Theory-Based) Transport Models.

- Electron transport in ITB plasmas (C.C. Petty, J.C. DeBoo, T.C. Luce, C.M. Greenfield), Experiment Nos. 2002-22-03 and -04. Yet to be completed.

- Critical T_e gradient and profile stiffness (T.C. Luce, J.C. DeBoo, C.C. Petty), Experiment No. 2002-22-05. Results:
  - — First dedicated ECH modulation experiment to use T_e response in the deposition region to probe ELMing H-mode plasmas. Data were obtained at three different locations at three different modulation frequencies.
  - — Data were obtained to look for a commensurate modulation in T_i.
  - — The measured phase lags do not indicate extreme stiffness.
  - — This proved the technique and revealed ELM complications to the analysis. The full experiment is yet to be done.

Nondimensional Transport Studies.

- Effect of T_e/T_i on turbulence (G.R. McKee), Experiment No. 2002-22-06. Yet to be completed.

- Confinement scaling near the L-H threshold (T.C. Luce, C.C. Petty), Experiment Nos. 2002-22-07 and -08. Results:

- One of two days was accomplished. It was determined that a different plasma shape would be required to complete the experiment, and this other shape was achieved in other experiments.
- Yet to be completed.

Core Transport Physics.

- Rotation in ECH and Ohmic H-mode (J.S. deGrassie), Experiment No. 2002-22-09. Results:
  - Clear radial profiles of toroidal rotation were obtained for ECH and Ohmic H-modes
  - The Ohmic H-mode is similar to C–Mod; a relatively flat co-rotation profile is measured.
  - The result in ECH H-mode is markedly different; a counter-rotation is measured in the inner half (in minor dimension). The transition from co outside to counter inside takes place in the region of ECH power deposition.
  - More experiments are necessary to vary the deposition profile.

- Shafranov shift stabilization in reactor relevant ITB discharges (J.E. Kinsey), Experiment No. 2002-22-010. Results:
  - Scans were carried out to independently vary ExB and the Shafranov shift in L-mode edge, NCS discharges by varying timing and the amount of early beam power and ECH.
  - Depending on the heating profiles used, very strong, albeit transient, core barriers were created in all transport channels.
  - The surprising discovery was how long the NCS phase lasted and how long q_{min} stayed above 2 (>2 s in some cases), lasting much longer than in previous NCs experiments.

1.2.2.3. Plan for 2003 by Subarea.

- Fundamental turbulence.
  - High k turbulence and electron transport — 1 day
  - Turbulence dependence up T_e/T_i (carry over from 2002) — 1 day

- Test of theory-based models.
  - Search for the T_e gradient — 1 day
  - Electron transport in ITB plasmas (carry over from 2002) — 1 day
  - Search for critical T_e gradient (alternate method — only in the 19-week plan) — 1 day

- Nondimensional transport.
  - — Beta scaling of confinement 1 day
  - — Aspect ratio experiments (with NSTX and MAST — only in the 19-week plan 1 day
- Core transport physics.
  - — Effect of rf on plasma rotation (continuation of 2002 experiment) 1 day
  - — Electron transport barriers 1 day
  - — Shafranov shift and q-profile effects on core barrier formation (only in the 19-week plan) 1 day
- H-mode physics.
  - — High resolution edge measurements across the L-H transition 1 day
  - — Edge asymmetries nad the L-H transition (only in the 19-week plan) 1 day

1.2.3. BOUNDARY PHYSICS (Leader: S.L. Allen)

1.2.3.1. Results From 2002.

A total of six run days were allotted in 2002, of which all but 1/2 day resulted in a successful experiment. By topic, the experiments were:

Topic	Allotted Days	Result
Magnetic balance studies	1.5	Successful
Scrape-off-layer (SOL) transport in H-mode	1.0	Successful
Simple as possible plasmas (SAPP)	1.0	Successful
ELMs at high time resolution	1.0	Successful
Impurity puffing vs. density	1.0	Successful
Erosion in impurity radiative divertor	0.5	Not attempted

The magnetic balance studies are import to investigate the trade-offs between double-null (DN) and single-null (SN) operation as projected to a burning plasma. It is found that even modest shifts in the magnetic balance between divertors (DN vs SN) in ELMing H-mode produce substantial changes in: 1) the locations where the ELM pulses are likely to interact with the vessel structure, 2) the particle flux profiles at the inner divertor target and the electron density on the inboard side, 3) the recycling at the divertor targets, 4) core and edge plasma properties. The DN configuration in ELMing H-mode presents interesting opportunities and challenges. A challenge is that precise control over the magnetic balance of a DN may be necessary. But potential advantages are that particle pumping may not be necessary on the inboard side, with reduced requirements for armor on the inboard side. And gas fueling may be more efficient from the inboard side of a DN. These are in addition to the advantages of the DN configuration relative to AT development.

SOL transport experiments have shown that intermittency is a significant source of transport there. This anomalous form of transport is consistent with indications that the main chamber walls are a significant source of recycling, and carbon. Plasma is transported to the walls for this interaction by this anomalous intermittency, meaning fast, intermittent events which transport “blobs” of particles and heat across the magnetic field. These structures are created near the last closed flux surface and carry significant fractions of the escaping plasma energy.

The SAPP experiments are designed to start with the simplest possible conditions, e.g., no ELMs, no detachment, etc, and use the full DIII-D edge diagnostic capability to make measurements which allow tests of the basic physics models and codes developed to describe the edge. This will provide a basis from which to move to more complicated, more reactor relevant conditions. In general, for low density conditions it is found that the controlling processes at the outer divertor have probably been correctly identified and quantitatively characterized. The principal anomaly flagged so far relates to measurements of T_e near the target, potentially pointing to a deficiency in our understanding of sheath physics. Analysis is in progress.

High time resolution measurements of ELMs have been made with image-intensified CID and IRTV cameras. The fast gated, intensified camera has a 10-20 μs exposure time. It is seen that in the ELM cycle the divertor plasma re-attaches, then strongly detaches, and recovers in less than one millisecond. The inboard/outboard heat flux from an ELM is symmetric in low density conditions, and highly asymmetric in high density conditions. Data from the midplane probe will be correlated with other fast SOL diagnostics.

Impurity puffing experiments are being used to study transport processes in the SOL, and evaluate the source of carbon impurities entering the plasma. Methane is puffed into the boundary region from various locations and detailed edge and core measurements are made. Experiments were done with the vertical gradient B drift both downward, and upward.

1.2.3.2. Boundary TSA Issues for the Near Future.

- Transport.
  - Intermittency.
  - Main chamber plasma/wallinteraction.
  - Drifts.
- ELMs and the pedestal.
  - ELM amplitude reduction.
  - ELM-free regimes.
  - Fueling.
- Carbon.
  - Tritium uptake.
  - Divertor and main chamber sources.
    - ★ Parallel and radial transport.
    - ★ Drifts.
- Active control.
  - Radiative divertor in the double-null.
  - Radiative divertor in the RDP.

1.2.3.3. Boundary Working Groups' Experiments for 2003.

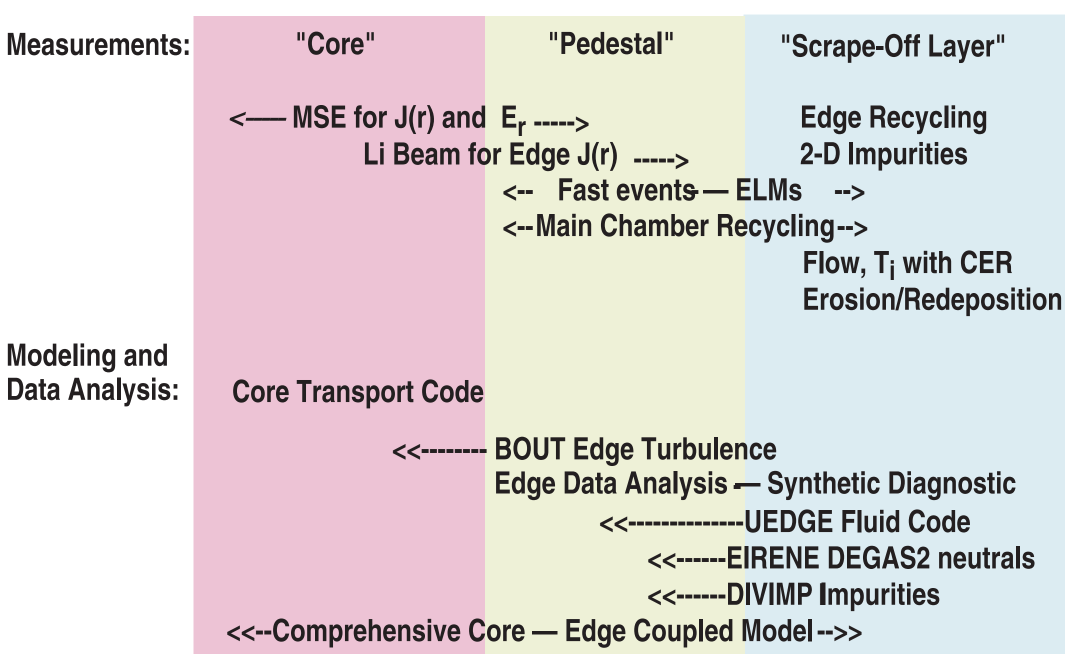
- The boundary TSA is organized into five working groups.
  - Edge transport working group.
  - Impurity and plasma surface interactions.
  - ELMs andother transient phenomena.
  - Divertor shape and configuration.
  - Divertor heat flux control.

These working groups made the following prioritized list of experiments for the 2003 campaign.

DIVERTOR AND SOL AND WORKING GROUPS SUMMARY 2003

1. Edge Transport Working Group: Gary Porter, Coordinator
   - *1.1 Characterize poloidal distribution of turbulence -BOUT* — 1 day
   - *1.2 Characterize role of walls on determining ion fueling rate*
2. Impurity and Plasma Surface Interactions, P. Stangeby, coor.
   - *2.1 Basic Understanding of Tritium Co-Deposition* — 2 days
   - *2.2 Importance of Chemical vs. Physical Sputtering of Carbon*
   - *2.3 Carbon erosion in a radiative divertor*
   - *2.4 Divertor Physics in a helium plasma*
3. ELMS and other transient phenomena, M. Fenstermacher,
   - *3.1 Density dependence of ELM parallel vs. perpendicular propagation* — 2 days
   - *3.2 In/Out Asymmetries ELM heat and particle with ExB drift*
4. Divertor shape and configuration, Tom Petrie coordinator
   - *4.1 Divertor shape and magnetic balance* — 1 day
   - *4.2 H-mode performance in near-DN configurations*
5. Divertor Heat Flux Control, Steve Allen coordinator
   - *5.1 MARFES & density limit -- use ECH and drifts*
   - *5.2 Narrow heat pulse (JET) 0.5 & radiation near slot 0.5*

THE CORE-EDGE INTERFACE — MEASUREMENTS AND MODELING



1.2.4. HEATING AND CURRENT DRIVE PHYSICS (Leader: R. Prater)

1.2.4.1. Electron Cyclotron Heating and Current Drive.

- Measured off-axis ECCD efficiency over a wide range of plasma parameters, for normalized minor radius up to 0.4 and compared the result to detailed comparisons with the Fokker-Planck code QCL3D
  - The model fits well, but extension of the parameter range to larger minor radius and higher electron temperature is required.
  - The reduction of the decrement in ECCD due to electron trapping was found to be consistent with the model, and the result that the decrement decreases with electron beta is well understood from the physics.
  - Scans of the parallel index of refraction from negative (co-ECCD) to positive (counter-ECCD) showed approximately equal efficiency in the co- and counter-current directions.
- Experimental results on stabilization of the 3/2 neoclassical tearing mode by localized ECCD indicate that the profile of dirven current is notmuch wider than expected from the model despite theoretical suggestions that transport of energetic electrons shouldbroaden the profile measurably.

1.2.4.2. High Boostrap Fraction Plasmas.

- The objectives are to determine the self-consistent pressure and current profiles reached by a plasma with nearly 100% bootstrap current and to study the long-term evolution and stability of such profiles.
- The principal result is that discharges with >100% noninductive current have been obtained, with 70% of the noninductive current generated by the bootstrap effect and the remainder by neutral beam current drive
  - The discharges were obtained by operating the tokamak with no Ohmic heating transformer.
  - Improved bootstrap current and decreased neutral beam current were found in discharges with higher density.

1.2.4.3. Tools for 2003.

- ECH
  - 3 CPI gyrotrons, which operate at 1 MW for 5 s pulses.
  - 3 Gycom gyrotrons, which operate at 0.7 MW for 2 s pulses.

  - New PPPL 2002 antenna pair and P2001 antenna pair, each with two beams that are independently steerable in the vertical and horizontal direction.
  - P1999 antenna, in which the vertical steering for two beams is coupled (non-independent).

- ICRF
  - FMIT transmitter for 60 MHz operation.
  - Possibly one ABB transmitter for 120 MHz operation.
  - Four-strap antennas for each transmitter.

1.2.4.4. Goals for 2003 Campaign.

- Commission new gyrotrons and antennas (1 day)
  - One new gyrotron (CPI production #3)
  - All launchers have been reworked over the vent period and need calibration validation and testing

- ECCD physics (2 days)
  - Extend the measurements of ECCD to larger values of the normalized minor radius (up to 0.6), which is where the ECCD is needed for AT plasmas.
  - Compare quantitatively the Fisch-Boozer and the Ohkawa components of the ECCD and compare with theory.
  - Measure the wave absorption at the 3rd harmonic for improved characterization of other experiments and applications, and compare with a new theoretical model.
  - Measure whether flux surfaces remain equipotentials when ECH/ECCD is applied.

- High bootstrap fraction plasmas (1 day)
  - Extend the previous results to higher density and reduced neutral beam current fraction.
  - Examine the role of ECCD in these discharges.

- ICRF (1 day, 19-week plan)
  - Determine the ICRF coupling characteristics for AT plasmas.
  - Measure fast wave current drive in discharges with high electron beta, where single pass damping should be much higher than in all previous studies.

1.3. RESEARCH PROPOSALS RECEIVED

Submitted ideas for DIII-D Experimental Proposals 2003

Click on the ID to see the corresponding idea. Click on the buttons on the title row to sort on the corresponding column.

ID	Author	Institution	Title	Topic Group
1	deGrassie, John S.	General Atomics	QH MODE IN HELIUM DISCHARGE?	QH-Mode
2	DeBoo, Jim	GA	Transport in ITB Discharges	Confinement and Transport
3	DeBoo, Jim	GA	Test for Non-linear Te response to Modulated ECH	Confinement and Transport
4	Petty, C. Craig	General Atomics	ITB Physics: Rotation and Ti/Te	Confinement and Transport
5	Petty, C. Craig	General Atomics	Electron Heat Pinch	Confinement and Transport
6	Petty, C. Craig	General Atomics	Electron Transport in ITB Plasmas	Confinement and Transport
7	Petty, C. Craig	General Atomics	Extreme Off-Axis ECCD	Heating and Current Drive
8	Petty, C. Craig	General Atomics	Evidence for Critical Gradient in Electron Temperature	Confinement and Transport
9	Petty, C. Craig	General Atomics	Triangularity Scaling of Transport	Confinement and Transport
10	Petty, C. Craig	General Atomics	ECCD in High Beta Poloidal Plasmas	Heating and Current Drive
11	Petty, C. Craig	General Atomics	Beta Scaling of H-mode Pedestal Height	Pedestal and ELMs
12	Petty, C. Craig	General Atomics	ECCD in Long Pulse, High Performance Discharges	Hybrid Scenarios
13	Petty, C. Craig	General Atomics	Demonstration of a Compact Ignition Tokamak Scenario	Confinement and Transport
14	Petty, C. Craig	General Atomics	Current Drive in the Current Hole	Heating and Current Drive
15	Petty, C. Craig	General Atomics	Higher Beta With High qmin Using Pressure Profile Control	Advanced Scenario Development
16	Petty, C. Craig	General Atomics	Higher Beta with ECCD Suppression of 2/1 NTM	Neoclassical Tearing Modes
17	Petty, C. Craig	General Atomics	High Performance Operation With Te=Ti	Advanced Scenario Development
18	Petty, C. Craig	General Atomics	Electron Transport Barriers	Confinement and Transport
19	Petty, C. Craig	General Atomics	Similarity Comparisons at Fixed Greenwald Factor	Confinement and Transport
20	BUTTERY, RICHARD J	EURATOM/UKAEA FUSION ASSOCIATION	CROSS-MACHINE SCALING OF NTM PHYSICS USING BETA RAMP-DOWNS	Stability
21	BUTTERY, RICHARD J	EURATOM/UKAEA FUSION ASSOCIATION	ROLE OF ROTATION AND ERROR FIELD IN TRIGGERING M/N=2/1 NTMS	Stability
22	BUTTERY, RICHARD J	EURATOM/UKAEA FUSION ASSOCIATION	ASPECT RATIO DEPENDENCE ON NTM THRESHOLDS WITH DIII-D/MAST I	Stability
23	Petty, C. Craig	General Atomics	Beta Scaling of Confinement in ELMing H-mode Plasmas	Confinement and Transport
24	Petty, C. Craig	General Atomics	Transport Broadening of ECCD	Heating and Current Drive
25	Makowski, Mike	LLNL	High beta-N AT Scenario with Flat Pressure Profile	Advanced Scenario Development
27	Petty, C. Craig	General Atomics	3/2 NTM Stabilization Without the 3rd Harmonic	Neoclassical Tearing Modes
28	Petty, C. Craig	General Atomics	Pulsed ECCD for 3/2 NTM stabilization using PCS	Neoclassical Tearing Modes
29	deGrassie, John S.	General Atomics	TOROIDAL ROTATION IN ECH-H MODE	Confinement and Transport
30	Lazarus, Ed	ORNL	The Sawtooth in Bean and Oval Shapes	Stability
31	Prater, Ronald	GA	Test of Ohkawa current vs Fisch-Boozer current	Heating and Current Drive
32	Brooks, Neil H.	General Atomics	Low energy sputtering of carbon in helium discharges	Divertor and Edge Physics
33	Youchison, Dennis L.	Sandia National Laboratories	Tungsten Rod Armor DiMES Sample Exposure to DIII-D Plasma	Divertor and Edge Physics
34	Taylor, Robert J.	UCLA	3D Optical Correlation Diagnostic	Confinement and Transport
35	La Haye, Robert J	General Atomics	Raising beta without m/n=3/2 NTMs by use of ECCD	Neoclassical Tearing Modes
36	La Haye, Robert J	GENERAL ATOMICS	Edge control with n=3 use of I-Coil for ergodization	Pedestal and ELMs
37	Petty, C. Craig	General Atomics	Fast Wave Coupling to Advanced Tokamak Discharges	Advanced Scenario Development
38	Ferron, John	General Atomics	Increase achievable beta_n in high f_BS discharges	Advanced Scenario Development
39	Ferron, John	General Atomics	n=1 beta limit versus edge pedestal height	Advanced Scenario Development
40	Ferron, John	General Atomics	Feedback control of current profile	Advanced Scenario Development
41	Baylor, Larry R.	ORNL	Pellet Injection as a Pedestal Modification Tool - aka Tickl	Pedestal and ELMs
42	Baylor, Larry R.	ORNL	Test of HFS Pellet Fueling Fast Transport Theory	Confinement and Transport
43	Prater, Ronald	GA	Compare ECH and ECCD for stabilization of 3/2 NTMs	Neoclassical Tearing Modes
44	Prater, Ronald	GA	Test of scaling of stabilizing terms in Rutherford Equation	Stability

45	Kinsey, Jon E.	Lehigh University	Stiffnesss of H-mode Core and Pedestal	Confinement and Transport
46	La Haye, Robert J	GENERAL ATOMICS	Magnetic braking in qmin>2 plasma above the no-wall beta lim	Resistive Wall Modes
47	Moyer, Rick	UCSD	Investigate ELM/pedestal control with stochastic edge	Pedestal and ELMs
48	Baylor, Larry R.	ORNL	High Density Operation Compatible with Burning Plasma Scenar	Hybrid Scenarios
49	Jayakumar, Jay	LLNL	Current Hole experiments with 2002 Shafranov Shift Experime	Advanced Scenario Development
50	Jayakumar, Jay	LLNL	Current Hole experiments with 2002 Shafranov Shift Experime	Heating and Current Drive
51	Wong_, Clement	General Atomics	Heated and wetted Li-DiMES	Divertor and Edge Physics
52	Jayakumar, Jay	LLNL	ECCD with shifting plasma:	Heating and Current Drive
53	Jayakumar, Jay	LLNL	Low qedge Discharges with Flat q Profiles in Advanced Plasma	Resistive Wall Modes
54	Jayakumar, Jay	LLNL	NCS Plasma with Broad Pressure Profile and high q min:	Advanced Scenario Development
55	Jayakumar, Jay	LLNL	Dependence of No-Wall Limit on Shape and X point location	Resistive Wall Modes
56	Stangeby, Peter C.	U of Toronto and GA	Simple-as-Possible Plasma Shots for Tritium Retention Studie	Divertor and Edge Physics
57	Jayakumar, Jay	LLNL	Systematic study of the Dependence of Stability on qm	Resistive Wall Modes
58	Baylor, Larry R.	ORNL	Higher Density Operation of the QH-mode and Compatibility wi	QH-Mode
59	Jayakumar, Jay	LLNL	Tearing Mode amplitude, mode number and q profile evolution	Hybrid Scenarios
60	Gentle, Kenneth	University of Texas	Cold-Pulse Experiments on DIII-D Using Pellets	Confinement and Transport
61	Lasnier, Charles	LLNL	Dependence of QH density on power	QH-Mode
62	Lasnier, Charles	LLNL	Dependence of QH mode on Plasma Current	QH-Mode
63	Lasnier, Charles	LLNL	Importance of hot ions, input power, and rotation gradients	QH-Mode
64	Moyer, Rick		Do QH modes have a stochastic boundary?	QH-Mode
65	Gray, Douglas S.	UCSD	Study of self-mitigation in disruptions	Stability
66	Gray, Douglas S.	UCSD	Main chamber radiated power during type-I ELMs	Divertor and Edge Physics
67	Hollmann, Eric M.	University of California, San Diego	Imaging gas jet penetration during disruption mitigation	Stability
68	Jackson, Gary L.	GA	EXTERNALLY INDUCED ROTATING MAGNETIC FIELDS USING I-COILS	Resistive Wall Modes
69	Hollmann, Eric M.	University of California, San Diego	Imaging gas jet penetration during disruption mitigation	Stability
70	Cirant, Sante	IFP/CNR	swing ECH	Confinement and Transport
71	Fenstermacher, Max	LLNL	Argon Radiative Divertor in a Helium Puff and Pump Plasma	Divertor and Edge Physics
72	Cirant, Sante	IFP/CNR	swing ECCD	Confinement and Transport
73	Fenstermacher, Max	LLNL	ExB Effects on ELMs in the SOL/Divertor	Divertor and Edge Physics
74	Fenstermacher, Max	LLNL	SOL ELM Propagation Physics	Divertor and Edge Physics
75	Jackson, Gary L.	GA	STABILIZATION OF 2/1 NTMs WITH m/n=2/1 I-COIL CURRENT	Stability
76	Fenstermacher, Max	LLNL	DIII-D / JET Helium plasma similarity experiments	Divertor and Edge Physics
77	Fenstermacher, Max	LLNL	DIII-D Helium Campaign	Divertor and Edge Physics
78	Pitts, Richard	TCV at CRPP-EPFL	Parallel Electric Currents during ELMs on DIII-D, TCV & JET	Divertor and Edge Physics
79	Wampler, William R	Sandia National Laboratories	DiMES First Wall Erosion	Divertor and Edge Physics
80	Gohil, Punit	GA	Improved Physics understanding of QDB/QH-mode operation	QH-Mode
81	Evans, Todd	GA	Lithium sputtering and transport in low power plasmas	Divertor and Edge Physics
82	West, Phil	General Atomics	Particle Balance in Ohmic and ELMing H-mode	Divertor and Edge Physics
83	Fenstermacher, Max	LLNL	Pedestal ECH to Test Stability Collisionality Dependence	Pedestal and ELMs
84	West, Phil	General Atomics	Enhanced Electric Field Well in Co-injection Using Neon Neut	QH-Mode
85	Evans, Todd	GA	SOL current propertires during Li DIMES exposures	Divertor and Edge Physics
86	Jackson, Gary L.	GA	ELM modification with I-coils	Pedestal and ELMs
87	whyte, Dennis G	University of Wisconsin - Madison	Carbon erosion with argon-induced detached plasmas	Divertor and Edge Physics
88	Whyte, Dennis G	University of Wisconsin - Madison	HC dissociation & transport studies: porous plug injection	Divertor and Edge Physics
89	Whyte, Dennis G	University of Wisconsin - Madison	Test of gas jet penetration scaling: disruption mitigation	Stability
90	Sauter, Olivier	CRPP - EPFL	CONTROL OF 3/2 NTMS ONSET WITH SAWTOOTH CONTROL	Neoclassical Tearing Modes
91	Sauter, Olivier	CRPP - EPFL	Control of 3/2 NTMs onset with sawtooth control	Stability
92	Snipes, Joseph A	MIT Plasma Science and Fusion Center	EDA H-mode with High Recycling	Divertor and Edge Physics

93	La Haye, Robert J	GENERAL ATOMICS	Plasma rotation and the n=1 kink (RWM) dispersion relation	Resistive Wall Modes
94	Osborne, Tom	General Atomics	JET/DIII-D H-mode Pedestal Dimensionless Scaling Experiment	Pedestal and ELMs
95	Osborne, Tom	General Atomics	NSTX/DIII-D H-mode Pedestal Dimensionless Scaling Experiment	Pedestal and ELMs
96	Osborne, Tom	General Atomics	Small ELMs at High Pedestal Pressure at High Density and Pow	Pedestal and ELMs
97	Ohaybu, Nobuyoshi	National Institute for Fusion science	Effects of ergodic layer on pedestal	Pedestal and ELMs
98	Murakami, Masanori	ORNL@DIII-D	Full noninductive AT operation using off-axis ECCD	Advanced Scenario Development
99	Murakami, Masanori	ORNL@DIII-D	Central magnetic shear control using fast wave current drive	Advanced Scenario Development
101	Murakami, Masanori	ORNL@DIII-D	Validation of Edge Bootstrap Current Models	Pedestal and ELMs
102	Guenter, Sibylle	IPP Garching	High confinement with (3,2) FIR-NTMs	Neoclassical Tearing Modes
103	Murakami, Masanori	ORNL@DIII-D	Modeling of fast wave heating and current drive in AT plasma	Heating and Current Drive
104	Hender, Tim	UKAEA Culham	Effects of harmonic mix on error field thresholds in DIII-D	Stability
105	Hender, Tim	UKAEA Culham	DIII-D/JET RWM comparison experiment	Resistive Wall Modes
106	Guenter, Sibylle	IPP Garching	Rotation breaking by "non-resonant" fields	Resistive Wall Modes
107	West, Phil	General Atomics	Impurity and particle transport measurements in the QH-mode	QH-Mode
108	Burrell, Keith H.	General Atomics	Role of edge j(r) and Er in stabilizing ELMs in QH-mode	QH-Mode
109	Burrell, Keith H.	General Atomics	Quiescent H-mode in co-injected plasmas	QH-Mode
110	Evans, Todd	GA	Extending the QH-mode (ELM Free H-mode) to high density	QH-Mode
111	Heidbrink, William W.	UC Irvine	Hydrogen puffing for ICRF Species Mix Diagnostic	Heating and Current Drive
112	Heidbrink, William W.	UC Irvine	Tests of D_alpha Beam-Ion Profile Diagnostic	Stability
113	de Baar, Marco	FOM instituut voor plasmafysica Rijnhuiz	q-profile and ITB formation	Confinement and Transport
114	Austin, Max	Univ. of Texas	Filamentation and Electron Transp. Barriers with Intense ECH	Confinement and Transport
115	Austin, Max	Univ. of Texas	Third Harmonic Electron Cyclotron Heating	Heating and Current Drive
116	Baker, Dan R	GA	Central Heating without central particle source	Confinement and Transport
117	Baker, Dan R	Ga	Ip ramp and ECH to vary Te and q profiles independently	Confinement and Transport
118	Baker, Dan R	GA	Reproduce C-Mod ITB on DIII-D	Confinement and Transport
119	Baker, Dan R	GA	Anomolous Electron to Ion Heat Transfer	Confinement and Transport
120	Baker, Dan R	GA	Create Pressure Anisotropy with RF	Confinement and Transport
121	Baker, Dan R	GA	Test Ledge at the Edge Dependence on I Coil and C Coil	Divertor and Edge Physics
122	Burrell, Keith H.	General Atomics	Does transport set edge gradients in QH-mode?	QH-Mode
123	Burrell, Keith H.	General Atomics	Increase edge density in QH-mode plasmas	QH-Mode
124	Burrell, Keith H.	General Atomics	ECH sustained QH-mode	QH-Mode
125	Burrell, Keith H.	General Atomics	Determine which ions produce heat on upper baffle in QH-mode	QH-Mode
126	Gohil, Punit	GA	Real-time control of plasma profiles for steady state opn	Advanced Scenario Development
127	Gohil, Punit	GA	ITBs with Te~Ti	Confinement and Transport
128	Bravenec, Ronald V.	University of Texas	Benchmarking turbulence codes against "simple" discharges	Confinement and Transport
129	Burrell, Keith H.	General Atomics	Effect of error field minimization on QH-mode plasmas	QH-Mode
130	Burrell, Keith H.	General Atomics	Does the EHO enhance edge impurity loss?	QH-Mode
131	Burrell, Keith H.	General Atomics	Improved startup phase for quiescent H-mode	QH-Mode
132	Burrell, Keith H.	General Atomics	Investigate effect of ICRH on quiescent H-mode	QH-Mode
133	Burrell, Keith H.	General Atomics	Investigate effect of ICRH on quiescent H-mode	QH-Mode
134	ONGENA, Jef P.H.E.	ERM-KMS, Lab Plasmaphysics, 1000 Brussel	JET-DIIID Similarity discharges at hi delta with Ar seeding	Confinement and Transport
135	THOMAS, Paul R	CEA Cadarache	Control of edge transport barriers using the I-coils	Pedestal and ELMs
136	Burrell, Keith H.	General Atomics	Test of neoclassical prediction of toroidal rotation differe	Confinement and Transport
137	okabayashi, Michio	PPPL	Transition of quasi-stationary RWM to Oscillatory RMW Mode a	Stability
138	Okabayashi, michio	PPPL	Validity studies of "mode rigidity" hypothesis for RWM/RFA	Resistive Wall Modes
139	Garofalo, Andrea M		Beta-dependence of critical plasma rotation for RWM onset	Resistive Wall Modes
140	Garofalo, Andrea M	Columbia University	Continuos measurement of RFA vs betaN and vs plasma rotation	Resistive Wall Modes
141	Garofalo, Andrea M	Columbia University	Measurement of internal RWM structure	Resistive Wall Modes

142	Petrie, Thomas W.	General Atomics	CAN (OR SHOULD) QH-MODE BE RUN IN DOUBLE-NULL?	QH-Mode
143	Petrie, Thomas W.	General Atomics	BEST GAS PUFFING LOCATION: HIGH-FIELD SIDE vs LOW-FIELD SIDE	Divertor and Edge Physics
144	leonard, Anthony W	General Atomics	JET/DIII-D Type I ELM Dimensionless Scaling Experiment	Pedestal and ELMs
145	leonard, Anthony W	General Atomics	Pedestal Width Scaling with Power	Pedestal and ELMs
146	Petrie, Thomas W.	General Atomics	IS ELM PULSE INTENSITY AFFECTED BY SOL FLUX EXPANSION?	Divertor and Edge Physics
147	leonard, Anthony W	General Atomics	ELM In/Out Asymmetry in Reversed Bt	Divertor and Edge Physics
148	leonard, Anthony W	General Atomics	Detached Divertor Operation in Reversed Bt.	Divertor and Edge Physics
149	leonard, Anthony W	General Atomics	Edge Bootstrap Current Measurement in Optimized Configuratio	Pedestal and ELMs
150	leonard, Anthony W	General Atomics	Validation of the Lithium Beam Edge Current Measurement.	Pedestal and ELMs
151	leonard, Anthony W	General Atomics	Type I ELM Rho-star scaling	Pedestal and ELMs
152	Petrie, Thomas W.	General Atomics	IS THE AT-SCENARIO CONSISTENT WITH A RADIATIVE DIVERTOR?	Advanced Scenario Development
153	leonard, Anthony W	General Atomics	QH-mode density or collisionality threshold	QH-Mode
154	Petrie, Thomas W.	General Atomics	TRANSIENT PARTICLE FLOW IN THE DIVERTOR AFTER AN ELM PULSE?	Divertor and Edge Physics
155	Burrell, Keith H.	General Atomics	Do all ions have the same Ti in the SOL of QH-mode plasmas?	QH-Mode
156	Burrell, Keith H.	General Atomics	Effect of Ip ramps on edge parameters at the L-H transition	Confinement and Transport
157	Evans, Todd	GA	ELM modification with a "clean" stochastic boundary	Pedestal and ELMs
158	Garofalo, Andrea M	Columbia University	Induce plasma rotation using n=1 RFA	Resistive Wall Modes
159	Reimerdes, Holger	Columbia University	MHD spectroscopy on a marginally stable RWM	Resistive Wall Modes
160	Garofalo, Andrea M	Columbia University	Test dynamic error correction using I-coil	Resistive Wall Modes
161	Reimerdes, Holger	Columbia University	RWM Momentum Dissipation Profile	Resistive Wall Modes
162	Reimerdes, Holger	Columbia University	Non-Resonant Braking with up to 7 kA C-coil Currents	Resistive Wall Modes
163	Garofalo, Andrea M	Columbia Unversity	Test RWM feedback using I-coil in n=3 braked plasma	Resistive Wall Modes
164	Garofalo, Andrea M	Columbia University	Test of RWM control using bang-bang feedback	Resistive Wall Modes
165	Valovic, Martin	UKAEA Fusion	Aspect ratio scan of heat transport with MAST and DIII-D	Confinement and Transport
166	Guenter, Sibylle	IPP Garching	High confinement with (3,2) FIR-NTMs	Stability
167	Bravenec, Ron		Comparisons of measurements and simulations (GYRO) of turbul	Confinement and Transport
168	Bateman, Glenn	Lehigh University	Power dependence of H-mode pedestal height	Pedestal and ELMs
169	Mahdavi, M. Ali	GA	Pedestal and confinement enhancement with pellet fueling	Pedestal and ELMs
170	Petrie, Thomas W.	General Atomics	GENERALIZATION OF RESULTS FROM PREVIOUS DRSEP STUDIES	Divertor and Edge Physics
171	Schoch, Paul M.	Rensselaer Polytechnic Institute	Measurements of potential using a heavy neutral beam	Confinement and Transport
172	Petrie, Thomas W.	General Atomics	WHY IS DETACHMENT DIFFERENT AT LOW AND HIGH TRIANGULARITY?	Divertor and Edge Physics
173	Mahdavi, M. Ali	GA	Pedestal self similarity part-II	Pedestal and ELMs
174	Jackson, Gary L.	GA	Externally Induced B fields to trigger EHO with Co-Injection	QH-Mode
175	Hubbard, Amanda E.	MIT Plasma Science and Fusion Center	Dimensionless Comparison of L-H threshold conditions on C-Mo	Pedestal and ELMs
176	Navratil, Gerald A	Columbia University	Current Hole Target Plasma for RWM Studies	Resistive Wall Modes
177	Politzer, Pete	GA	Flux transport by quasi-stationary tearing modes	Stability
178	Mossessian, Dmitri A.	MIT	1. Extend similarity experiment into type I ELMs regime to s	Pedestal and ELMs
179	Navratil, Gerald A	Columbia University	Study Onset of n=2 RWMs	Resistive Wall Modes
180	Politzer, Pete	GA	Flux evolution and transport by sawteeth	Stability
181	Mossessian, Dmitri A.	MIT	Similarity with RF heating and lower upper triangularity	Pedestal and ELMs
182	Politzer, Pete	GA	Stabilization of the 3/2 mode – study of mode competition	Stability
183	Politzer, Pete	GA	Stationary, fully noninductive plasmas	Advanced Scenario Development
184	Petrie, Thomas W.	General Atomics	CAN HEAT FLUX OUTSIDE THE SLOT DIVERTOR BE REDUCED?	Divertor and Edge Physics
185	Politzer, Pete	GA	High bootstrap fraction, fully noninductive operation	Heating and Current Drive
186	Politzer, Pete	GA	Fully noninductive, EC sustained plasmas	Heating and Current Drive
187	Navratil, Gerald A	Columbia University	Use of RFA of n=2 Mode for Rotation Control	Resistive Wall Modes
188	Politzer, Pete	GA	Bootstrap current physics near the axis using holes	Heating and Current Drive
189	Politzer, Pete	GA	Fusion ignition and burn simulation with beams	Confinement and Transport
190	Evans, Todd	GA	Impact of the C-coil on the DIII-D edge plasma	Divertor and Edge Physics

191	Politzer, Pete	GA	Effect of V versus I regulation on edge behavior	Pedestal and ELMs
192	Politzer, Pete	GA	ECH modification of SOL thermal & electric conductivity	Divertor and Edge Physics
193	Politzer, Pete	GA	ELMs – nonlinear physics and control	Pedestal and ELMs
194	Politzer, Pete	GA	Other applications for the I-coil	Advanced Scenario Development
195	Politzer, Pete	GA	Avalanches (L- and H-mode; power scaling)	Confinement and Transport
196	Garofalo, Andrea M	Columbia University	Large rho_qmin and qmin AT scenario development	Advanced Scenario Development
197	Gohil, Punit	GA	Affect of ECH on particle, ion and momentum transport	Confinement and Transport
198	Boedo, Jose	UCSD	ELM SOL characterization and transport Studies	Pedestal and ELMs
199	Greenwald, Martin	MIT	Edge turbulence and the density limit	Confinement and Transport
200	Snyder, Phil	GA	Tests of the Peeling-Ballooning Model of ELMs/Pedestal	Pedestal and ELMs
201	Garofalo, Andrea M	Columbia University	Test stability at high beta in plasma with flat q-profile	Stability
202	Garofalo, Andrea M	Columbia University	Test stability at high beta in plasma with flat q-profile	Stability
203	Doyle, Edward	UCLA	Impurity and density profile control in high performance ITB	Advanced Scenario Development
204	Kim, Jin-Soo	FARTECH, Inc.	Multi-sensor RWM identification via Kalman filter	Resistive Wall Modes
205	Makowski, Michael A.	LLNL	Discharges with beta_N ~ 4 * li and high q_min	Advanced Scenario Development
206	Reimerdes, Holger	Columbia University	Resonant Braking by Feedback Control of a Finite Amplitude	Resistive Wall Modes
207	Horton, Wendell	Institute for Fusion Studies, UT Austin	Critical Gradients and Thermal Loss Channels	Confinement and Transport
208	Doyle, Edward	UCLA	Is density or collisionality key to QH-mode?	QH-Mode
209	Garofalo, Andrea M	Columbia University	Demonstrate betaN>4 for 2 s	Advanced Scenario Development
210	Nave, M. Filomena F.	IST, Lisbon, Portugal	EHO STABILITY WITH IP RAMP-DOWN / SIMILARITY WITH JET OM	QH-Mode
211	Groebner, Richard J.	General Atomics	Effect of flux expansion on density pedestal width	Pedestal and ELMs
212	Rhodes, Terry L.	UCLA	Existence of high-k density turbulence on DIII-D (k*rho_i >5	Confinement and Transport
213	McKee, George R	University of Wisconsin-Madison	Dependence of Turbulence on Te/Ti in L-mode plasma	Confinement and Transport
214	Nave, M. Filomena F.	IST, Lisbon, Portugal	EXTERNAL KINK EFFECT ON ELM-FREE PHASE DURATION IN CO-INJ.	QH-Mode
215	McKee, George R	University of Wisconsin-Madison	Parametric scaling of Geodesic Acoustic Mode characteristics	Confinement and Transport
216	Luce_, Tim	GA	Fully non-inductive AT discharges	Advanced Scenario Development
217	Boedo, Jose	UCSD	2-D imaging of intermittency in DIII-D boundary	Divertor and Edge Physics
218	Greenfield, Charles M.	General Atomics	Internal Transport Barriers with Te~Ti	Confinement and Transport
219	Zeng, Lei	UCLA	Measurement of EHO Characteristics - Location and Amplitude	QH-Mode
220	Boedo, Jose	UCSD	Poloidal variations of intermittent transport	Divertor and Edge Physics
221	Luce, Tim	GA	Stabilization of the 2/1 tearing mode with ECCD	Neoclassical Tearing Modes
222	Prater, Ronald	GA	Commissioning of ECH systems	Heating and Current Drive
224	Boedo, Jose	UCSD	2-D imaging of ELMS	Pedestal and ELMs
225	Luce, Tim	GA	Avoidance of 2/1 Tearing Modes with ECCD	Neoclassical Tearing Modes
226	Luce, Tim	GA	Electron Bernstein Wave Heating	Heating and Current Drive
227	Ferron, John	General Atomics	Assess achievable beta at higher li values	Stability
228	Zeng, Lei	UCLA	ELM Radial Transport Studies	Pedestal and ELMs
229	Ferron, John	General Atomics	Benchmarking of edge stability with new edge J measurements	Pedestal and ELMs
230	Ferron, John	General Atomics	Low-n second stable access and initial ELMs	Pedestal and ELMs
231	Garofalo, Andrea M	Columbia University	Develop target with low plasma-rotation using RF heating	Resistive Wall Modes
232	evans, Todd	GA	An experimental search for homoclincic tangles in the DIII-D	QH-Mode
233	Wang, Guiding	UCLA	Study of L-H Transition and ELM Dynamics via Reflectometry o	Pedestal and ELMs
234	Pigarov, Alexander	UCSD	Scalings for cross-field transport in SOL	Divertor and Edge Physics
235	Wong, King-Lap	PPPL	Investigation of Particle and Momentum Transport in ECH Plas	Heating and Current Drive
236	Krasheninnikov, Sergei	UCSD	Non-diffusive impurity transport in SOL	Divertor and Edge Physics
237	Strait, Ted	GA	Comparison of Br and Bp sensors for RWM control	Resistive Wall Modes
238	Wade, Mickey		Operation above the no-wall beta limit in Long-Pulse Plasmas	Hybrid Scenarios
239	Rudakov, Dmitry	University of California San Diego	Role of "coherent" modes on edge pedestal and ELM hehavior	Pedestal and ELMs
240	Luce, Tim	GA	Sawtooth Stabilization with ECH/ECCD	Stability

241	Luce, Tim	GA	Mass Scaling at Fixed Dimensionless Parameters	Confinement and Transport
242	Strait, Ted	GA	RWM feedback control with single/multiple inputs and outputs	Resistive Wall Modes
243	Greenfield, Charles M.	General Atomics	Search for ETG Streamers	Confinement and Transport
244	Luce, Tim	GA	Test of Profile Stiffness by Modulated ECH	Confinement and Transport
245	Krasheninnikov, Sergei	UCSD	IFE chamber afterglow phase at DIII-D	Pedestal and ELMs
246	Greenfield, Charles M.	General Atomics	QH-mode with co-NBI	QH-Mode
247	Mickey, Wade		Dependence of Conductivity on f_trap and Zeff	Heating and Current Drive
248	Rudakov, Dmitry	UCSD	Effect of Te fluctuations on swept Langmuir probe measuremen	Divertor and Edge Physics
249	Moyer, Rick	University of California San Diego	Test theories of EHO mode in QH mode	QH-Mode
250	Krasheninnikov, Sergei	UCSD	Time-dependent evolution of H-pedestal at L-to-H transition	Pedestal and ELMs
251	Wade, Mickey		Current Drive Components During AT Current Ramp	Advanced Scenario Development
252	Wong, King-Lap	PPPL	NCS Plasmas via Spontaneous Redistribution of Energetic Ions	Heating and Current Drive
253	Luce, Tim	GA	How far above the L-H threshold is far enough?	Confinement and Transport
254	Luce, Tim	GA	Test of Closure Schemes for gyro-fluid models	Confinement and Transport
255	Umansky, Maxim	LLNL	Effects of atomic physics on intermittent edge transport	Divertor and Edge Physics
256	Groth, Mathias	LLNL	Impurity and fuel transport in the SOL during ELMs	Pedestal and ELMs
259	Groth, Mathias	LLNL	Impurity sources and transport in the main SOL in SAPPs	Divertor and Edge Physics
260	Rudakov, Dmitry	UCSD	Intermittent edge transport in limited versus diverted plasm	Divertor and Edge Physics
261	Groth, Mathias	LLNL	Fueling location of the main plasma: Div vs. mainchamber?	Divertor and Edge Physics
262	Takahashi, Hiro	Princeton Plasma Physics Laboratory	Measurement of Radial Profile of SOL Current during EHO	Divertor and Edge Physics
264	Groth, Mathias	LLNL	Jet imaging during plasma disruption mitigation experiments	Stability
265	Groth, Mathias	LLNL	Imaging the lithium beam	Pedestal and ELMs
266	Bogatu, Nick	FARTECH, Inc.	Ar and K Concentration and Confinement in DIII-D Core Plasma	QH-Mode
267	Umansky, Maxim	LLNL	Impurity ion transport in edge plasma	Divertor and Edge Physics
268	Humphreys, Dave	General Atomics	Physics of disruptions mitigated on detection timescales	Stability
269	Edgell, Dana H.	FARTECH, Inc.	RWM ID using Matched Filter Advanced Sensor Combination	Resistive Wall Modes
270	Walker, Mike	General Atomics	Develop High-Accuracy DND X-Point MIMO control	Stability
271	Schaffer, Michael J	GA	L-H Transition and X-point Circulation	Pedestal and ELMs
272	Schaffer, Michael J	GA	Plasma Response to Error Correction	Resistive Wall Modes
273	Schaffer, Michael J	GA	ELMs and Inner Strike Power	Pedestal and ELMs
274	Schaffer, Michael J	GA	ELMs and Inner Strike Power	Pedestal and ELMs
275	Lao, Lang L	General Atomics	Plasma Response to Error Magnetic Field Using I-Coil	Resistive Wall Modes
276	Doyle, Edward	UCLA	ITB operation with Te~Ti	Advanced Scenario Development
277	Lao, Lang L	General Atomics	Effects of Error/Stochastic Field on Separatrixes and ELMs	Pedestal and ELMs
278	Kinsey, Jon E.	Lehigh University	Shafranov shift stabilization in H-mode ITB discharges	Confinement and Transport
279	Doyle, Edward	UCLA	Investigate beta limits in QDB plasmas	Advanced Scenario Development
280	Doyle, Edward	UCLA	Investigate beta limits in QDB plasmas	Stability
282	Carter, Troy A	UCLA	Effect of plasma rotation on intermittency in edge turbulenc	Divertor and Edge Physics
283	Nave, M. Filomena F.	IST, Lisbon, Portugal	EXTERNAL KINK EFFECT ON ELM-FREE PHASE DURATION IN CO-INJ	Stability
284	Finken, Karl H.	Forschungszentrum Juelich	Interaction of ELMs with edge ergodic magnetic fields	Divertor and Edge Physics
285	Zohm, Hartmut	IPP Garching	RWM Similarity Experiments between DII-D and ASDEX Upgrade	Resistive Wall Modes
286	Kirk, Andrew	UKAEA	Impact of ELMs on the pedestal and SOL	Pedestal and ELMs
287	Lao, Lang L	General Atomics	Test of ELM MHD Model in DIII-D, JT-60U, and AUG	Pedestal and ELMs
288	Savrukhin, Peter	Kurchatov Institute	Non-thermal electrons during magnetic reconnection at the sa	Stability
289	Fundamenski, Wojciech R	Euratom/UKAEA Fusion Association	SOL Energy Transport in ELMy H-modes	Divertor and Edge Physics
290	Andrew, Yasmin	JET	JET/DIII-D Triangularity L-H Transition Scaling Experiment	Pedestal and ELMs
291	Sips, George, A.C.C.	IPP Garching	Hybrid scenario: Similarity between DIII-D and ASDEX Upgrade	Hybrid Scenarios

292	Semenov, Igor	TRINITI	DISRUPTIONS STUDIES IN DIIID, (MIDLE D-SHAPED PLASMA),......	Stability
293	DONG, JIAQI	Institute for Fusion Studies	Dependence of Critical Electron Temperature Gradient on Plas	Confinement and Transport
294	Horton, Wendell	University of Texas	Ohms law for Drift Waves and Tearing Modes	Neoclassical Tearing Modes
295	Solano, Emilia R.	CIEMAT, Spain	Study of ELMs, strike point movements, peeling.	Pedestal and ELMs
296	Politzer, Pete	GA	q-profile regulation by tearing modes	Hybrid Scenarios
297	Luce, Tim	GA	Radiative Divertor in Stationary High Performance Discharges	Hybrid Scenarios
298	Luce, Tim	GA	Control of MARFEs with ECH	Divertor and Edge Physics
299	Luce, Tim	GA	AT Scenarios with T_i=T_e	Advanced Scenario Development
300	Luce, Tim	GA	Stationary high performance for 10s in DIII-D	Hybrid Scenarios
301	Greenfield, Charles M.	General Atomics	100% noninductive high performance discharges	Advanced Scenario Development
302	Razumova, K.	Kurchatov, Moscow, Russia	Electron ITB with ECH at 2 different rhos	Confinement and Transport
303	Wade, Mickey		Effect of Pressure Profile on Attainable Beta_N	Advanced Scenario Development
304	Luce, Tim	GA	Map the Existence Domain of the Hybrid Scenario	Hybrid Scenarios
305	Petty, C. Craig	General Atomics	Fiducial Discharges For Comparison With Hybrid Scenario	Hybrid Scenarios
306	Luce, Tim	GA	Sawtooth-free discharges by shaping	Stability
307	Wade, Mickey		Maximizing beta_N at high q_min	Advanced Scenario Development
308	Greenfield, Charles M.	General Atomics	Fast wave coupling in AT plasmas	Advanced Scenario Development
309	Maraschek, Marc	Max-Planck-Intstitut fuer Plasmaphysik	scaling of the marginal beta_p of 3/2 and 2/1 NTMs during	Neoclassical Tearing Modes
310	Wade, Mickey		Direct Measurement of the Edge Bootstrap Current	Pedestal and ELMs
311	Wade, Mickey		Helium Transport/Exhaust in High Performance Discharges	Hybrid Scenarios
312	Wade, Mickey		Impurity Transport in High Performance Discharges	Hybrid Scenarios
313	Petty, C. Craig	General Atomics	Te=Ti With Electron Heating in Hybrid Scenarios	Hybrid Scenarios
314	Greenfield, Charles M.	General Atomics	Profile control in QDB plasmas (part II)	Advanced Scenario Development
315	Wade, Mickey		Demonstrate stationary (> 20 tau_E) beta_N H ~ 9	Hybrid Scenarios
316	Luce, Tim	GA	Test of Z_eff Dependence of Bootstrap Current Models	Heating and Current Drive
317	Ernst, Darin R.	Mass. Inst. of Technology	Mechanisms for ITB Control with ECH	Advanced Scenario Development
318	Luce, Tim	GA	Tests of Bootstrap Current Models	Heating and Current Drive
319	Luce, Tim	GA	Is 3/2 Tearing Mode Suppression Worth the Cost?	Neoclassical Tearing Modes
320	Heidbrink, William W.	UCI	MHz (CAE/GAE) Alfven Similarity Experiment with NSTX	Stability
321	Luce, Tim	GA	ECCD Efficiency at High Electron Temperature	Heating and Current Drive
322	Solano, Emilia R.	CIEMAT, Spain	Driving negative toroidal current in "current hole" plasmas	Advanced Scenario Development
323	Martin, Yves	CRPP/EPFL	Magnetic triggering of ELMs	Pedestal and ELMs
324	Luce, Tim	GA	Is the EHO a metastable ballooning mode?	QH-Mode
325	Horton, Wendell	University of Texas	Ohms Law for Drift Waves and Microtearing Modes	Stability
326	Garofalo, Andrea M	Columbia University	Test wall stabilization vs. wall distance	Resistive Wall Modes
327	Philips, Volker	JET, UK	Carbon transport studies using injection of C13 methane	Divertor and Edge Physics
328	Wade, Mickey		Effect of ECH on Impurity Transport in High Performance Plas	Confinement and Transport
329	Okabayashi, Michio	PPPL	The critical V_phi dependence of RWM onset on rotational pro	Pedestal and ELMs
330	Okabayashi, Michio	PPPL	The critical V_phi dependence of RWM onset on rotational pro	Resistive Wall Modes
331	Jayakumar, Jay	LLNL	Effect of toroidal rotation on the q profile mofication by t	Hybrid Scenarios
332	Okabayashi, Michio	PPPL	Determining the dissipation coeffcient using Extended rumped	Resistive Wall Modes
333	Jayakumar, Jay	LLNL	Stability studies on high q- flat q prfile plasma	Hybrid Scenarios
334	Wade, Mickey	ORNL	Effect of Magnetic Geometry on Density Control	Divertor and Edge Physics

335	Jayakumar, Jay	LLNL	Stability studies on high q- flat q prfile plasma	Stability
336	Okabayashi, Michio	PPPL	Impact on ELMs with rotating ergotoc limiter produced by I-c	Pedestal and ELMs
337	Porter, Gary D.	LLNL	Edge Turbulence transport model validation	Pedestal and ELMs
338	McKee, George R	University of Wisconsin-Madison	Direct Comparison of Growth and Shearing Rates of Turbulence	Confinement and Transport
339	Wade, Mickey		Low Squareness, High Beta Discharges	Stability
340	Casper, Thomas A.	LLNL	Density and pressure control with EC for ITB conditions	Advanced Scenario Development
341	Wade, Mickey	ORNL	Low Squareness, Long Pulse High Performance Plasmas	Hybrid Scenarios
342	Casper, Thomas A.	LLNL	Comparison of transport modification in ITB discharges.	Advanced Scenario Development
343	Casper, Thomas A.	LLNL	Electron cyclotron modification of pedestal region parameter	Pedestal and ELMs
344	Murakami, Masanori	ORNL@DIII-D	Sustainment of hybrid discharges using CD	Hybrid Scenarios
345	Buzhinskij, Oleg I.	TRINITI	Graphite erosion at high heat flux	Divertor and Edge Physics
346	Politzer, Pete	GA	Energy spectrum of fast ions in the SOL	Divertor and Edge Physics
347	Buzhinskij, Oleg I.	TRINITI	In-situ Boronization	Divertor and Edge Physics
348	Greenfield, Charles M.	General Atomics	Deeply reversed current profiles	Advanced Scenario Development
349	Evans, Todd	GA	Edge current control with a stochastic layer	Pedestal and ELMs
350	Okabayashi, Michio	PPPL	Transition of quasi-stationary RWM to oscillatory RWM Mode	Resistive Wall Modes
351	Brennan, Dylan P.	GA/ORISE	Poles in delta_prime on Approach to a Sawtooth Crash	Stability
352	Pinsker, Robert I.	General Atomics	Re-commissioning of the FW systems	Heating and Current Drive
353	Brennan, Dylan P.	GA/ORISE	Effects of changes in beta on early tearing evolution	Stability
354	Brennan, Dylan P.	GA/ORISE	Effects of poles in delta_prime at high q_min	Stability
355	Reimerdes, Holger	Columbia University	Critical Rotation Frequency as a Function of Wall Distance	Resistive Wall Modes
356	Reimerdes, Holger	Columbia University	Critical Frequency as a Function of the External Resonant Fi	Resistive Wall Modes
357	Jayakumar, Jay	LLNL	AT plasma with bN>6 li with RWM stabilization	Advanced Scenario Development
358	Hatcher, Ron	PPPL	The optimization of active braking wave form and the explora	Resistive Wall Modes
359	Politzer, Pete	GA	Effect of static helical fields on edge stability and transp	Pedestal and ELMs
360	Jayakumar, Jay	LLNL	Discrimination between two models of RWM critical velocity:	Resistive Wall Modes
361	Gilmore, Mark	University of New Mexico	Dependence of Turbulent Correlation Lengths in DIII-D and NS	Confinement and Transport
362	Perkins, Francis W.	PPPL; DIII-D Colloration	Demonstration Discharges for Burning Plasma Experiments	Hybrid Scenarios
363	Moyer, Rick	University of California San Diego	Effect of Convective Transport on the Density Limit in DIII-	Divertor and Edge Physics
364	Maraschek, Marc	Max-Planck-Intstitut fuer Plasmaphysik	scaling of the marginal beta_p of 3/2 and 2/1 NTMs during	Stability
365	Andrew, Philip L	UKAEA	Test of the minimum puff amount for disruption mitigation	Stability
366	Umansky, Maxim	Lawrence Livermore National Laboratory	Intermittent edge transport in helium plasmas	Divertor and Edge Physics
367	Moyer, Rick	University of California San Diego	Effect of Islands and Stochasticity on LH transition	Confinement and Transport
368	Shats, Michael G.	Australian National University	Controlled Modification of the Edge Radial Electric Field	Confinement and Transport
369	Petty, C. Craig	General Atomics	Direct Measurement of ECCD Width from Modulated ECCD	Heating and Current Drive
370	Harris, Jeffrey H.	Australian National University	Cross-platform studies of rational surfaces and enhanced con	Confinement and Transport
372	Schmidt, G	PPPL	Pellet and gas jet studies	Stability
383	Rasmussen, David A.	Oak Ridge National Laboratory	Fast wave heating, CD & profile control in AT plasmas	Heating and Current Drive
384	Guzdar, Parvez N	University of Maryland	Effect of triangularity and shaping in edge plasma profiles	Divertor and Edge Physics
385	Evans, Todd	GA	Edge stochastic layer transport versus collisionality	Confinement and Transport
390	Solomon_2, Wayne		Main Ion Toroidal Rotation	Confinement and Transport
391	Solomon_3, Wayne		New CER system for poloidal rotation	Confinement and Transport
394	Hosea_2, Joel		Central electron heating with fast waves and ECH	Confinement and Transport
395	Nazikian_3, Raffi		Cascade modes in D3D	Stability
397	Bernabei_2, Stefano		ECCD avoidance of monstor sawteeth	Stability
398	Manickam_2, J		Sawtooth mitigation using ECCD	Stability
399	Kessel_2, Charles		High bootstrap fraction plasmas	Advanced Scenario Development

400	Menard_2, Jon		Boundary shape effects on plasma beta	Advanced Scenario Development
402	Synakowski_2, Ed		Aspect Ratio Studies in D3D and NSTX	Confinement and Transport
403	Fredrickson_2, Eric		CAE/GAE similarity experiment with NSTX	Stability
404	Sabbagh_2, Steve		RWM similarity experiment	Resistive Wall Modes
405	Menard_3, Jon		Application of MARS to NSTX	Resistive Wall Modes
406	Watkins, Jonathan G.	Sandia National Laboratories	Very Narrow Target Heat Flux in H mode	Divertor and Edge Physics
407	Watkins, Jonathan G.	Sandia National Laboratories	Density Control in DN	Divertor and Edge Physics
408	Watkins, Jonathan G.	Sandia	The unexplored SN/DN transition zone in the SOL	Divertor and Edge Physics
409	Schaffer, Michael J	GA	Direct Error Correction	Stability
410	Sabbagh, Steven A.	Columbia University	DIII-D / NSTX / MAST Resistive Wall Mode Similarity Experime	Resistive Wall Modes
411	Meade, Dale M.	PPPL	High Performance AT Modes for FIRE and ARIES-RS/AT	Advanced Scenario Development
412	Meade, Dale M.	PPPL	Evaluate Double Null and Single Null on NCS AT Performance	Advanced Scenario Development
413	Meade, Dale M.	PPPL	Optimization of Exhaust Power Handling NCS AT discharge	Advanced Scenario Development
414	Meade, Dale M.	PPPL	Effect of SN/DN on Elmy H-Mode Confinement	Confinement and Transport
415	Meade, Dale M.	PPPL	Effect of Divertor Topology on Elmy H-Mode Confinement	Confinement and Transport
416	Meade, Dale M.	PPPL	Effect of DN/SN and Divertor Pumping on H-Mode Threshold	Confinement and Transport
417	Doyle, Edward	UCLA	Studies of RF effects on momentum transport	Confinement and Transport
418	okabayashi, michio	PPPL	RFA excitation of n=1 second stable RWM mode and the explora	Resistive Wall Modes
419	okabayashi, michio	PPPL	A scheme of ELM noise elimination	Resistive Wall Modes
420	Horton, Lorne D.	Max-Planck-Institut fuer Plasmaphysik	Search for Type II ELMs on DIII-D	Pedestal and ELMs
421	Wang, Guiding	UCLA	Study of L-H Transition and ELM Dynamics via Reflectometry	Confinement and Transport
422	Politzer, Pete	GA	Fusion ignition and burn simulation with beams	Heating and Current Drive
423	Politzer, Pete	GA	Pressure profile control using driven islands	Advanced Scenario Development
424	Politzer, Pete	GA	Pressure profile control using driven islands	Neoclassical Tearing Modes
425	Watkins, Jon	Sandia	divertor solution without gas puffing	Hybrid Scenarios
426	Watkins, Jon	Sandia	High resolution QH heat flux profile	QH-Mode
427	Watkins, Jon	Sandia	Target Plate ELM measurements	Pedestal and ELMs
428	Watkins, Jon	Sandia	Increase QH density at smaller R and lower q	QH-Mode
429	Jayakumar, Jay		Stability of Current Hole Plasmas	Stability
430	Jayakumar, Jay	LLNL	AT plasma with bN>6 li with RWM stabilization	Advanced Scenario Development
431	Pironti, Alfredo	CREATE	Coil Current Anti-saturation controller	Stability
432	Garofalo, Andrea M	Columbia University	I-coil feedback for Gd scan with FY00 target	Resistive Wall Modes
433	Okabayashi, Michio	PPPL	Improvement of plamsa performance with RWM feedback control	Resistive Wall Modes
434	Okabayashi, Michio	PPPL	Optimization of the time derivative time constant of direct	Resistive Wall Modes
435	Okabayashi, Michio	PPPL	The optimization of poloidal m-value matching in direct feed	Pedestal and ELMs
436	Okabayashi, Michio		The optimization of poloidal m-value matching in direct fee	Resistive Wall Modes
437	Oikawa, Toshihiro	JAERI	Test of ELM stability model by edge current profile modifica	Pedestal and ELMs
438	Meyer, Hendrik	UKAEA Fusion	Effect of magnetic configuration on H-mode access close to D	Confinement and Transport
439	Garofalo, Andrea M	Columbia University	Large rho_qmin using flat-q-profile recipe	Advanced Scenario Development
440	Pinsker, Robert I.	General Atomics	FWCD at high central electron beta with 110 GHz ECH	Heating and Current Drive
441	Okabayashi, Michio	PPPL	Analysis of RWM experiemnlal results in DIIID with MARS co	Resistive Wall Modes
442	Parks, Paul B.	GA	Stealth pellet for disruption mitigation	Stability
443	Parks, Paul	GA	New Alpha Particle Diagnostic Using Gas Jet Tunnel	Hybrid Scenarios

Review or submit another DIII-D Research Proposal idea.

Review all submitted ideas ordered by topic. Review all submitted ideas by selected topic.

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Last updated November 1, 2002
Email questions or comments to John deGrassie

1.4. DETAILED LIST OF EXPERIMENTS

AREA	Area Number	Exp. Number	Exp_Name	Contingency (19wk)
Thrust01	01	01	Pedestal_JET/DIII-D_Similarity	
Thrust01	01	02	Test peeling/balooning ELM Day 1	
Thrust01	01	03	Test peeling/balooning ELM Day 2/Li-beam	
Thrust01	01	04	Stochasticity effect on edge/ELMs	
Thrust01	01	05	Thrust 1 Contingency	Contingency
Thrust03	03	01	Raise Beta without 3/2	
Thrust03	03	02	Raise Beta without 2/1 Day 1	
Thrust03	03	03	Raise Beta without 2/1 Day 2	
Thrust03	03	04	EC Control of Sawteeth	Contingency
Thrust04	04	01	Feedback Tools	
Thrust04	04	02	Error Correction / Dynamic Stabilization	
Thrust04	04	03	Physics near ideal wall limit	
Thrust04	04	04	Parametric Scans	
Thrust04	04	05	Demo Direct Feedback	
Thrust04	04	06	Tool Development at Lower Rotation	
Thrust04	04	07	Higher BetaN with Lower Rotation	
Thrust04	04	08	Get higher BetaN and/or longer sustainment	
Thrust04	04	09	Higher BetaN with Direct Feedback	
Thrust04	04	10	Thrust 4 Contingency	Contingency
Thrust08	08	01	BetaN>4 >2s BoundaryShape	
Thrust08	08	02	FW System for use in AT	
Thrust08	08	03	100% NI with RF; improved j control	
Thrust08	08	04	100% NI at high Beta Day 1	
Thrust08	08	05	100% NI at high Beta Day 2	
Thrust08	08	06	100% NI at high Beta Day 3	
Thrust08	08	07	BetaN>4 >2s P modification Day 1	
Thrust08	08	08	BetaN>4 >2s P modification Day 2	
Thrust08	08	09	P Control in QDB	
Thrust08	08	10	P Control in QDB Contingency	Contingency
Thrust08	08	11	BetaN>4 >2s P modification Contingency	Contingency
Thrust09	09	01	Increase edge ne in QH	
Thrust09	09	02	Role of edgeE/J in QH ELM stabilization	
Thrust09	09	03	QH in co-injection	
Thrust09	09	04	Transport and edge gradients in QH Contingency	Contingency
Thrust09	09	05	QH with ECH replace NBI Contingency	Contingency

AREA	Area Number	Exp. Number	Exp_Name	Contingency (19wk)
Thrust10	10	01	Domain of Hybrid Scenario Day 1	
Thrust10	10	02	Domain of Hybrid Scenario Day 2	
Thrust10	10	03	Hybrid Scenario with ECCD Contingency	Contingency
Thrust10	10	04	Hybrid Scenario above no-wall Limit	Contingency
Stability TSA	21	01	Sawtooth Physics	
Stability TSA	21	02	Disruption Mitigation/Massive Gas	
Stability TSA	21	03	NTM Threshold with cross-machine scaling	
Stability TSA	21	04	Error Field Effects	
Stability TSA	21	05	Sawtooth Control by ECCD	
Stability TSA	21	06	Alfven similarity with NSTX Contingency	Contingency
Stability TSA	21	07	MIMO Contingency	Contingency
Stability TSA	21	08	Stability of Current Hole Contingency	Contingency
Conf TSA	22	01	Beta Scaling of Confinement	
Conf TSA	22	02	High-k turbulence and e transport	
Conf TSA	22	03	High Resolution Edge in L->H	
Conf TSA	22	04	Effect of RF on Plasma Rotation	
Conf TSA	22	05	Turbulence Dependence on Te/Ti	
Conf TSA	22	06	e transport in ITB	
Conf TSA	22	07	Search for Critical Te gradient	
Conf TSA	22	08	e Transport Barriers	
Conf TSA	22	09	Edge asymmetry in L->H Contingency	Contingency
Conf TSA	22	10	Aspect Ratio Experiments Contingency	Contingency
Conf TSA	22	11	Search for Critical Te gradient Contingency	Contingency
Boundary TSA	23	01	Boundary Shape and Magnetic Balance	
Boundary TSA	23	02	Poloidal Turbulence Distribution	
Boundary TSA	23	03	ELMs parallel/perp	
Boundary TSA	23	04	ELMs in/out	
Boundary TSA	23	05	Codeposition characterization	
Boundary TSA	23	06	Codeposition terminal day	
Boundary TSA	23	07	Marfes/ECH Contingency	Contingency
H&CD TSA	24	01	ECH Commissioning	
H&CD TSA	24	02	Far off-axis ECCD	
H&CD TSA	24	03	High bootstrap fraction	
H&CD TSA	24	04	TBD HCD Day 4	
H&CD TSA	24	05	ECCD at high Te Contingency	Contingency
H&CD TSA	24	06	Full noninductive Contingency	Contingency

1.5. THE 2003 OPERATIONS SCHEDULE

The operations schedule is designed for efficient and safe use of the DIII–D facility. Thirteen calendar weeks of plasma physics operations is scheduled for the calendar year 2003. The plan is to have five 2- or 3-week run periods. The operations schedule is shown in Fig. 1. Operations are carried out 5 days per week for 8.5 hours. The 2003 operations schedule can be viewed at http://d3dnff.gat.com/schedules/fy2003.sch.htm.

In addition to operating the tokamak, maintenance has to be performed and new hardware is being installed to enhance DIII–D capabilities. The schedule for these activities is for the maintenance to be done when the tokamak is not operating.

Fig. 1. DIII–D master schedule FY2003 (13 week plan).

ACKNOWLEDGMENT

This is a report of work supported by the U.S. Department of Energy under Contract No. DE-AC03-99ER54463.