

U.S. Fusion Energy Sciences Program

Presented to

Kevin Cook

House Energy and Water Development
Subcommittee Staff

By

Dr. Anne Davies

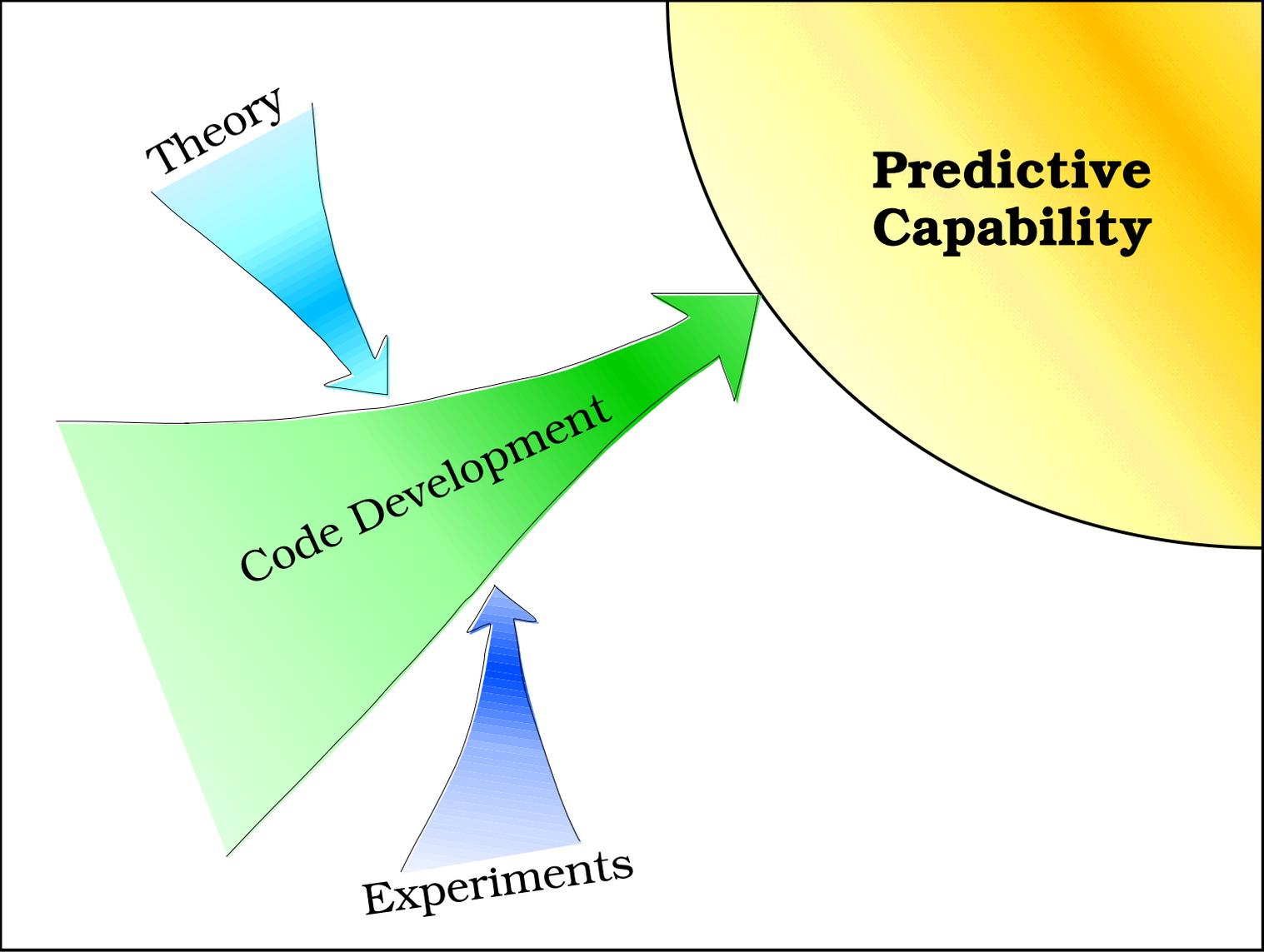
Associate Director
for Fusion Energy Sciences
Office of Science
Department of Energy

January 31, 2001

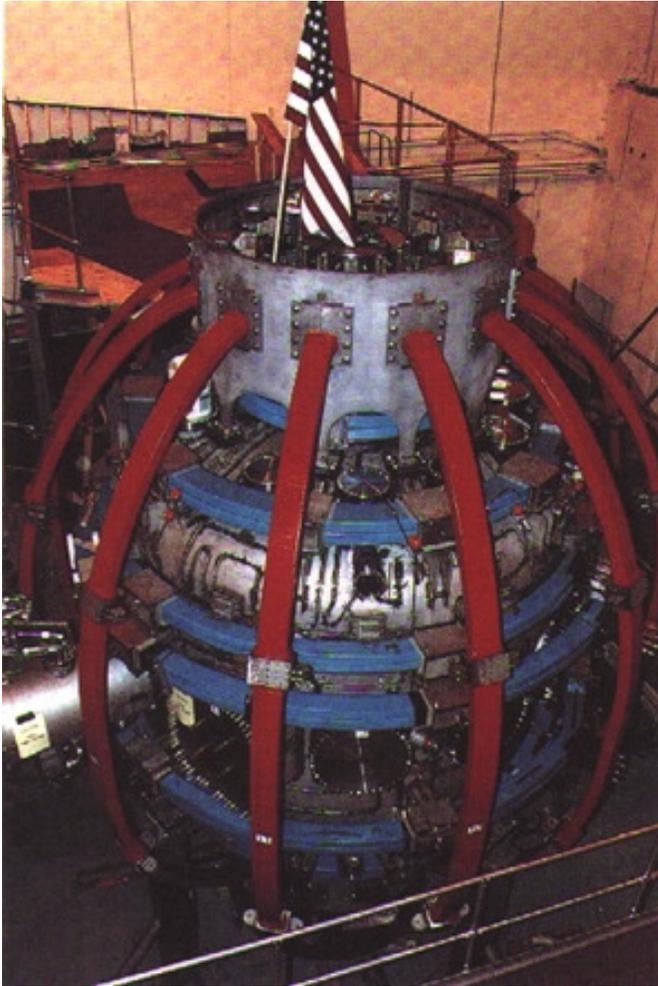
U.S. Fusion Energy Sciences Program Mission

“Advance **plasma science, fusion science**, and **fusion technology**-- the **knowledge base** needed for an **economically** and **environmentally attractive** fusion energy source.”

Objective of the U.S. Fusion Energy Sciences Program



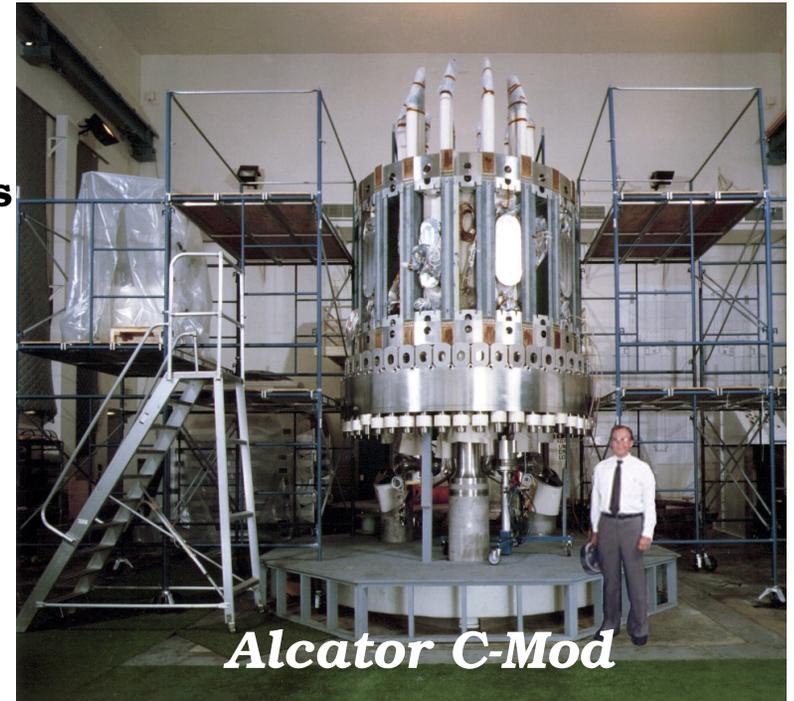
National Spherical Torus Experiment



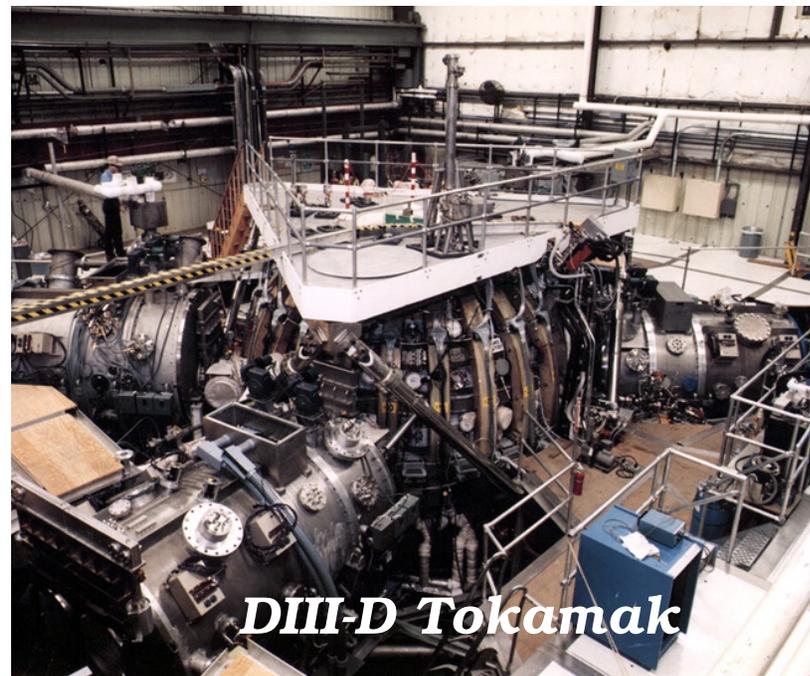
**Princeton Plasma
Physics Laboratory**
Torus started
Operations in 1999

Massachusetts Institute of Technology

C-Mod
Started
Operations
in October
1991



Alcator C-Mod

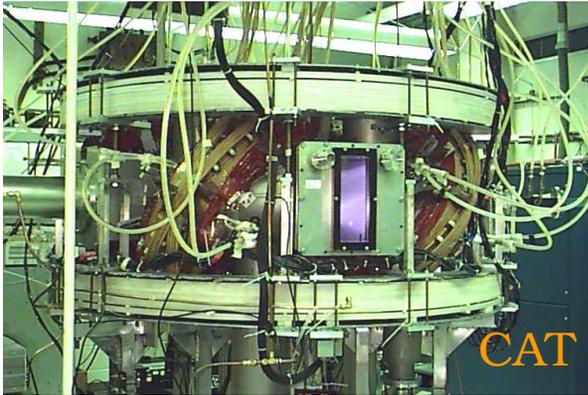


DIII-D Tokamak

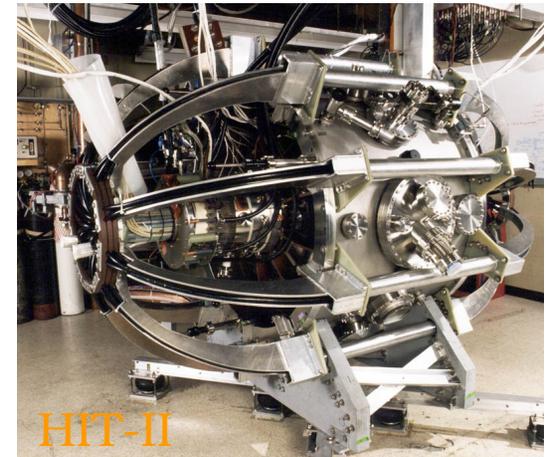
General Atomics

Doublet III
Started
Operations
In 1978

Innovative Confinement Concepts



Compact Auburn Torsatron
Auburn University, Auburn Alabama



Helicity Injected Torus-II Experiment
University of Washington, Seattle



Sustained Spheromak Plasma Experiment
Lawrence Livermore National Laboratory



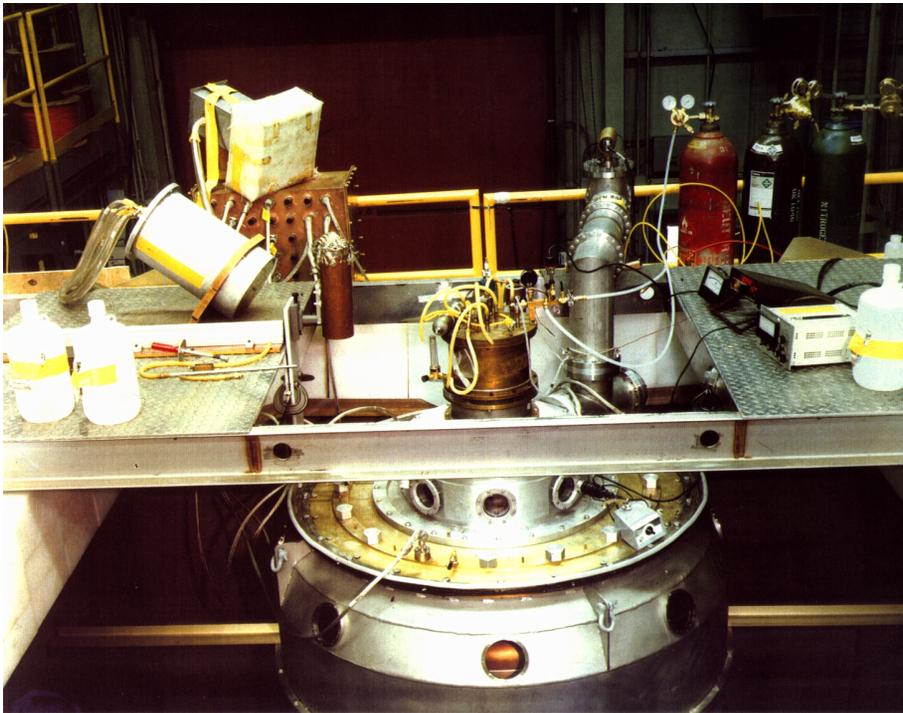
Levitated Dipole Experiment
Columbia University/Massachusetts
Institute of Technology



Helically Symmetric Experiment
University of Wisconsin, Madison

General Plasma Science

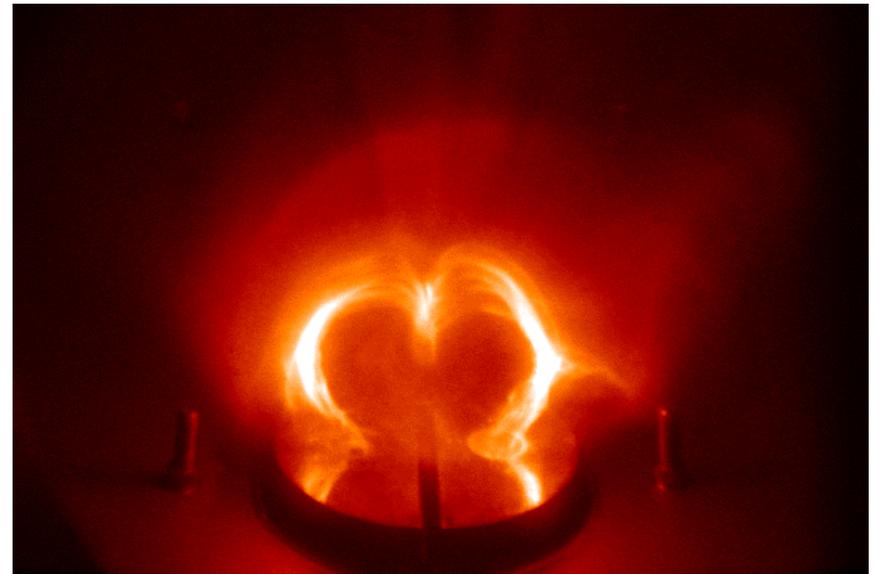
There are presently 9 Plasma Physics Science Junior Faculty Development Awards (+1 in cooperation with NSF)



Dense Z Pinch

University of Nevada-Reno

There are presently 31 NSF/DOE partnerships in Basic Plasma Science and Engineering Awards

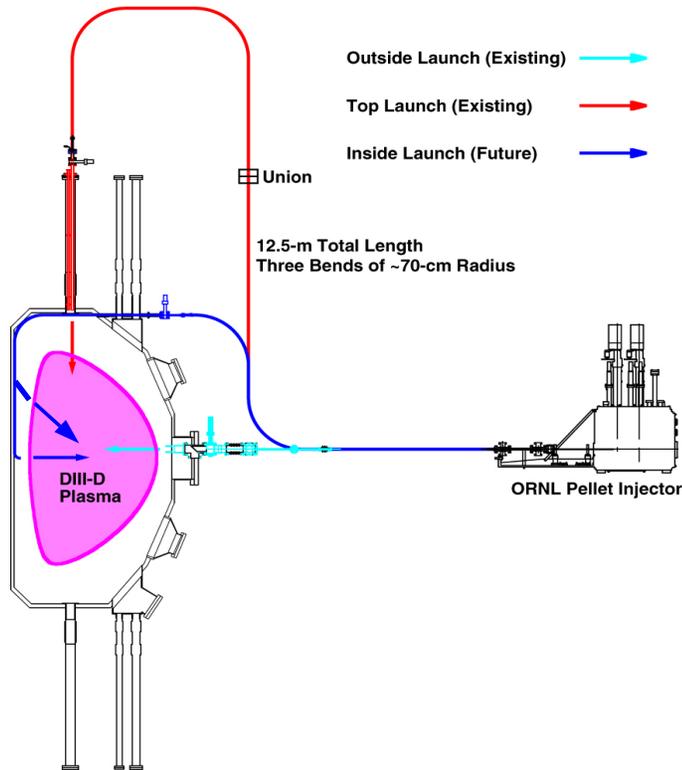


**Laboratory Simulation of
Solar Prominences**

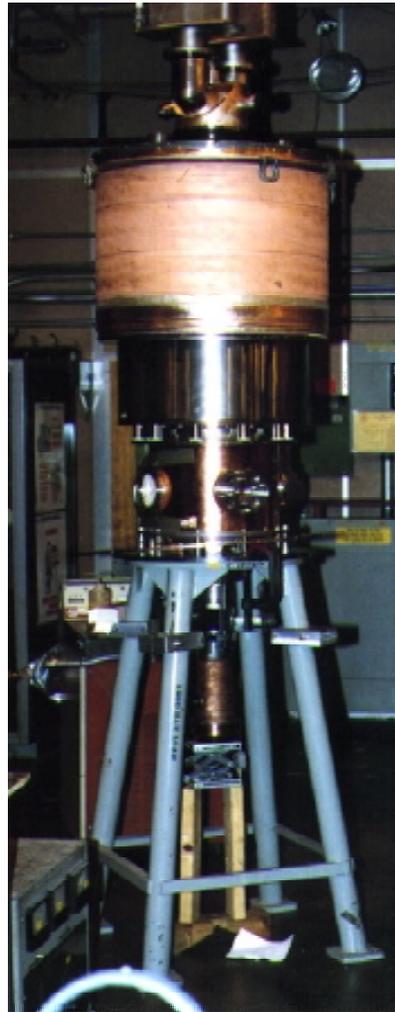
California Institute of Technology

Enabling Technologies Program

Pellet Injector in DIII-D for Plasma Fueling



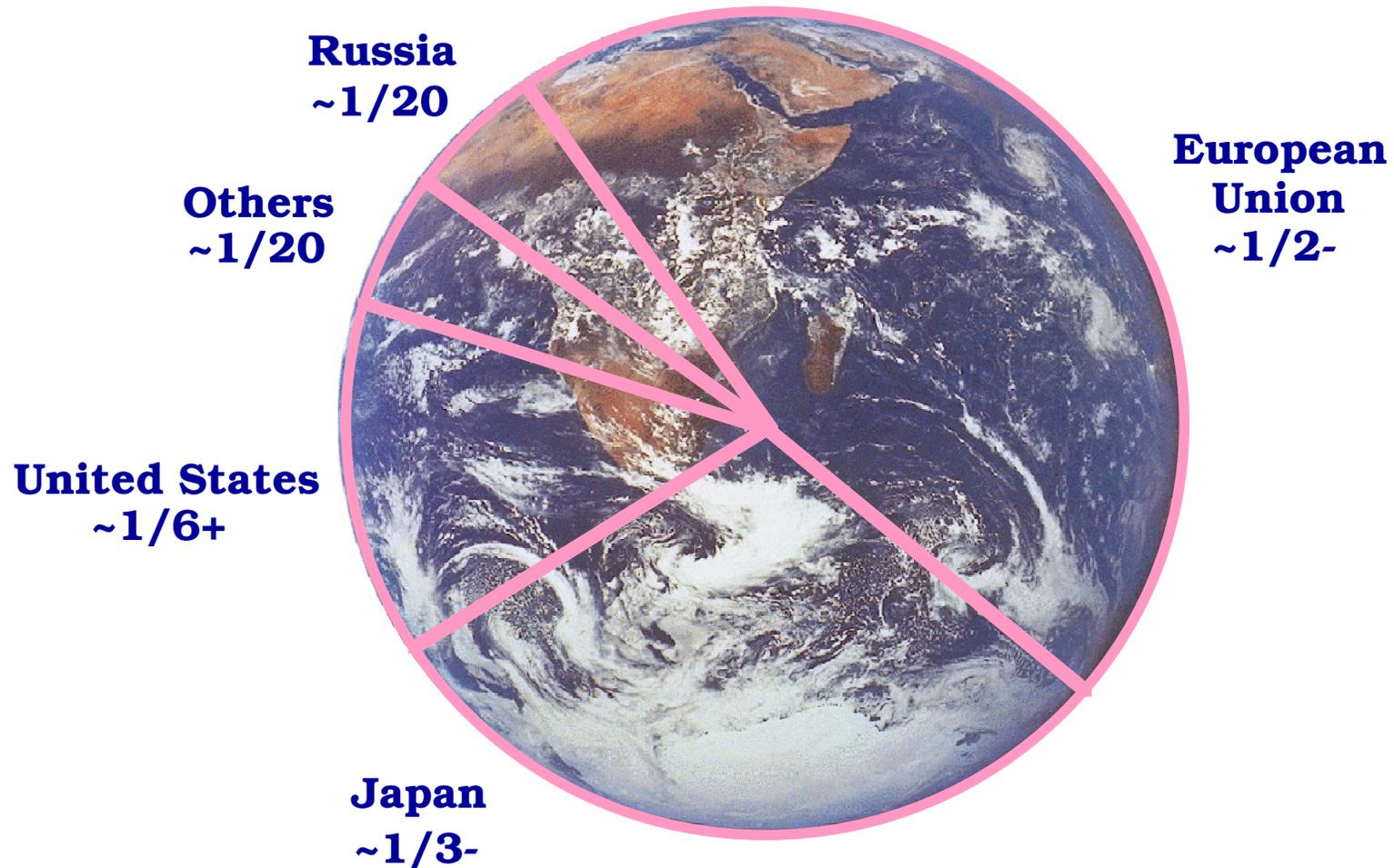
100 GHz Gyrotron Tube (1MW power in 1 second pulse) for Plasma Heating and Control



DiMES probe in DIII-D provides data on plasma material interactions.



World Magnetic Fusion Effort (2000)



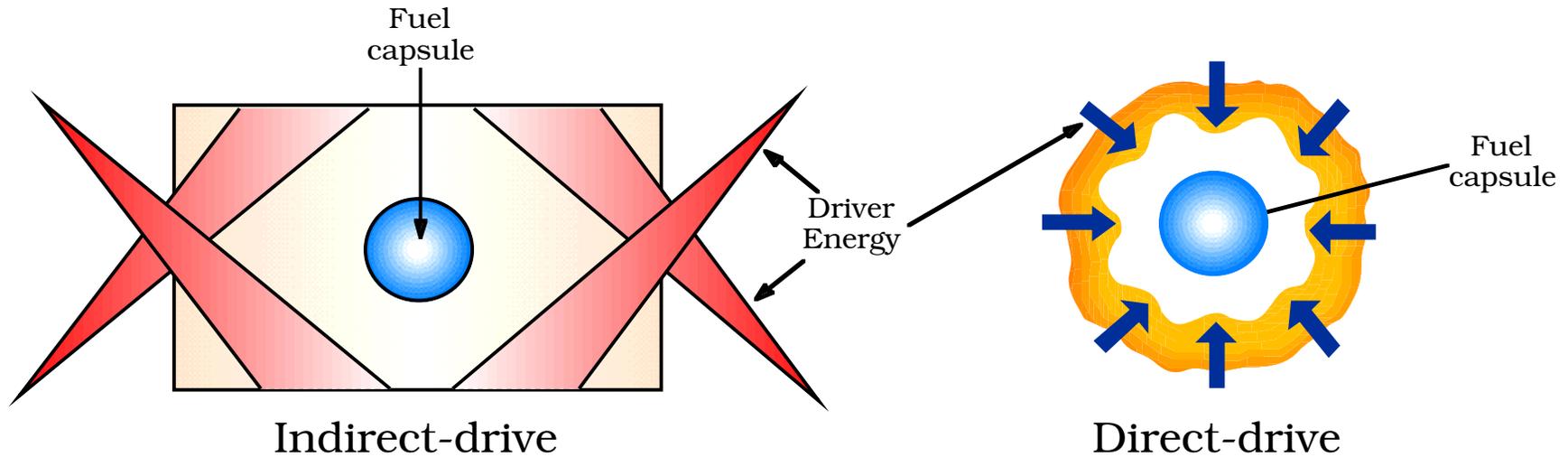
[Relative levels based on published budgets, rough estimates of personnel not included in budgets and rough conversions to dollars]

Inertial Fusion Energy

- o Defense Programs **conducting high energy density physics** using OMEGA, and NIKE lasers; National Ignition Facility under construction; results are used by Science in designing energy producing targets
- o SC developing **components** for energy applications, especially accelerator-based driver and target chamber technologies
- o Developing **international collaboration** through bilateral agreements

Inertial Fusion Energy Options

Targets



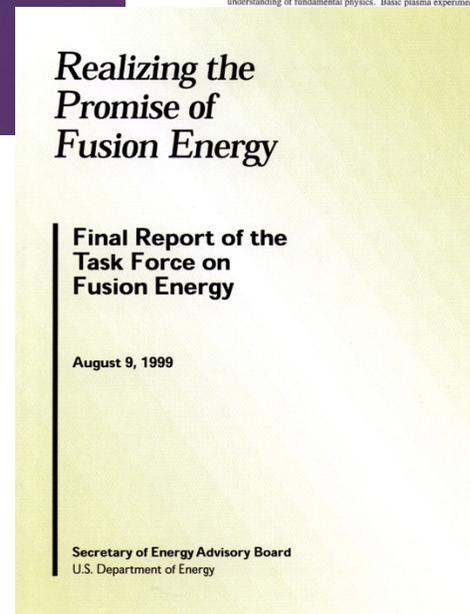
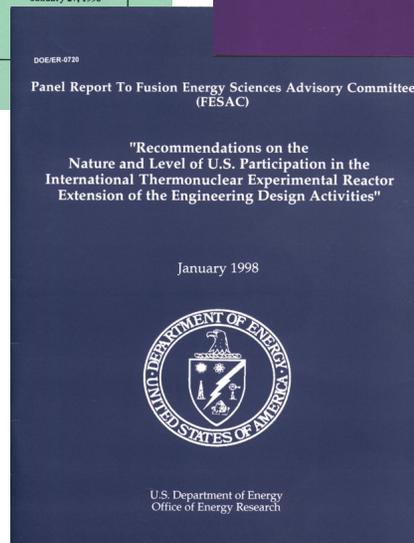
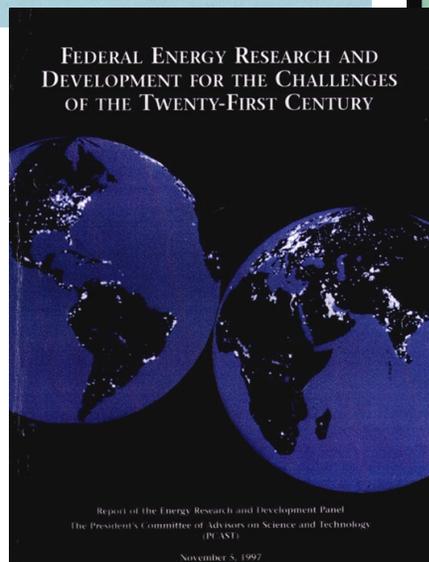
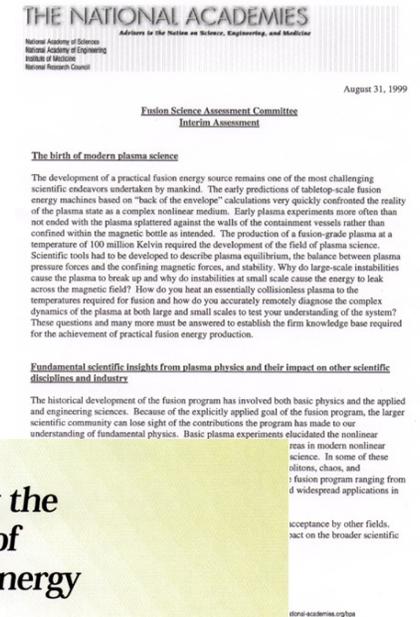
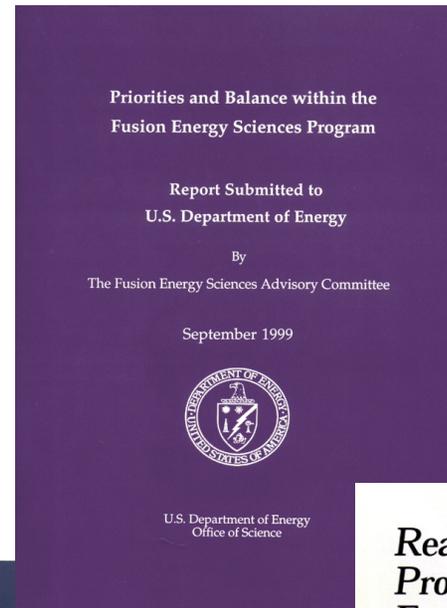
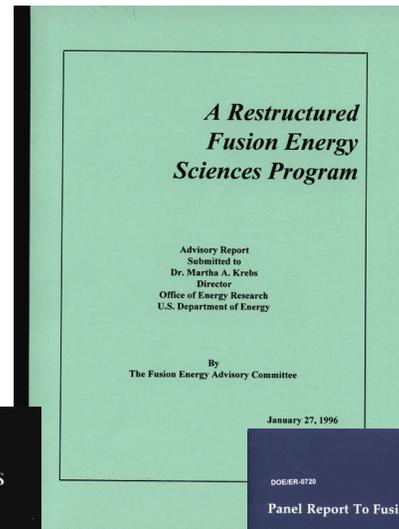
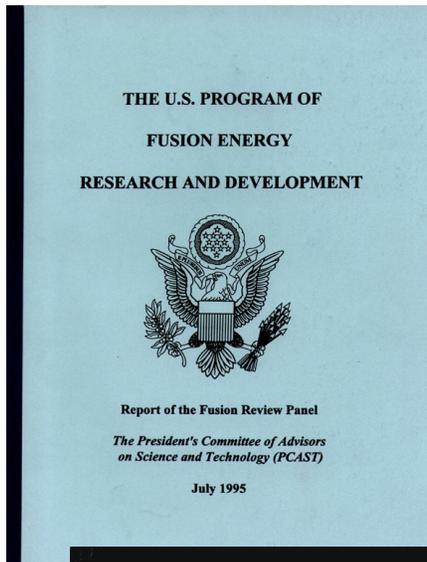
Drivers

Heavy Ions

KrF Laser

Diode Pumped Solid State Laser

Major Reviews of the Fusion Energy Sciences Program 1995-2000



Reports available at: http://www.foe.er.doe.gov/More_HTML/FESAC_Charges_Reports.html

National Research Council Review

- o Key Finding: **Excellent Science**

- o Key Recommendations:
 - Organize program around **fusion science issues** (instead of how to develop a concept into a reactor)

 - Connect with other **scientific disciplines**

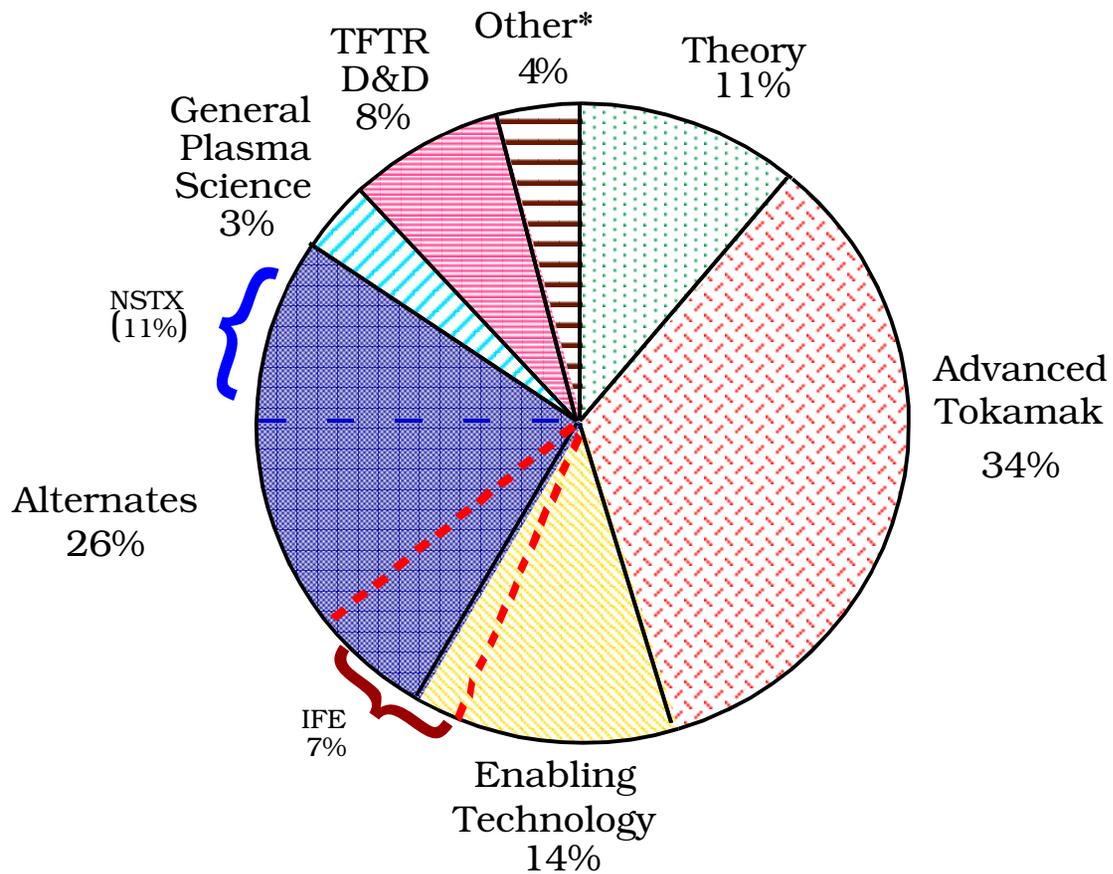
 - Partner with **NSF**

FESAC Review

- o Culmination of **other reviews** and **workshops**
- o Broad **community representation** and consensus
- o Recommendations for **resource allocations**
 - Amongst MFE thrust areas
 - Between MFE and IFE
- o Adopted by DOE in allocating FY 2000 and 2001 funds

Fusion Energy Sciences Budget

FY 2001 Appropriation



Total \$248.5M

Other*
SBIR/STTR
GPP
Waste Management

Office of Fusion Energy Sciences Website

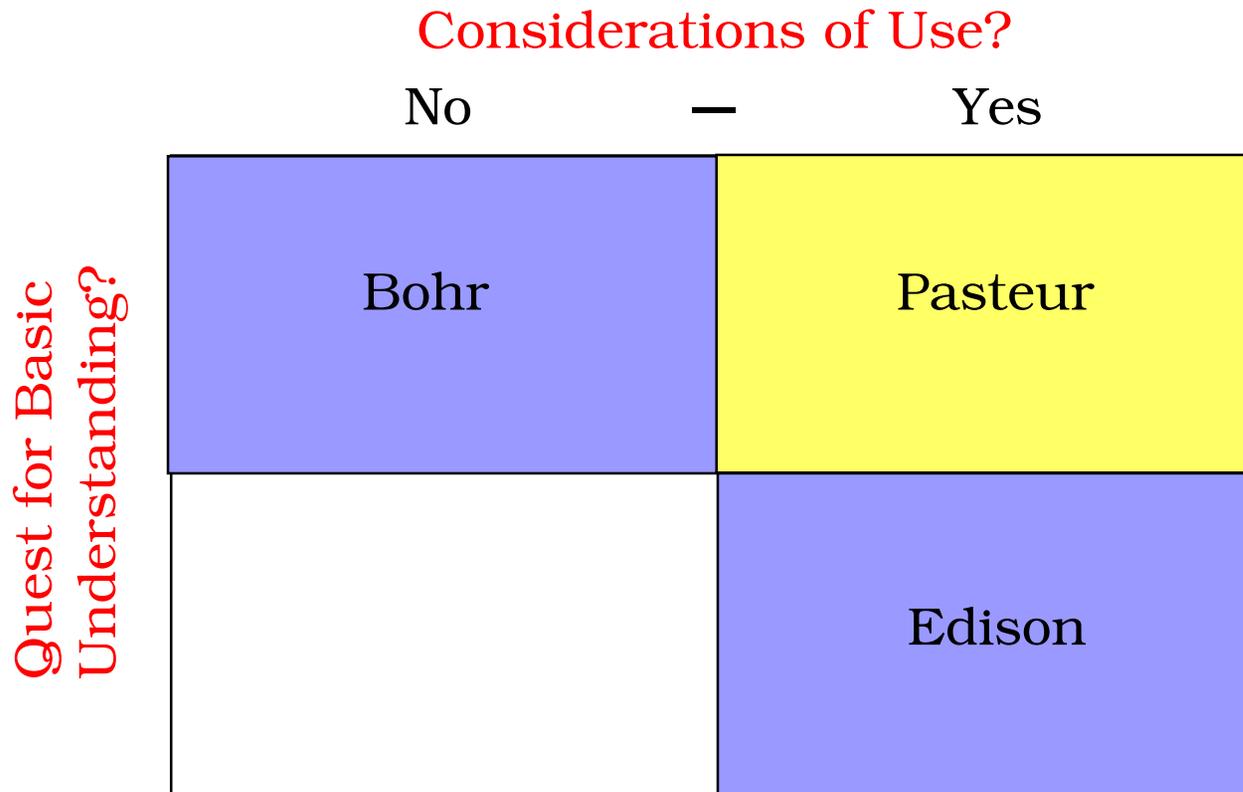
<http://www.ofes.science.doe.gov/>

BACKUP SLIDES

Fusion Energy is in Pasteur's Quadrant

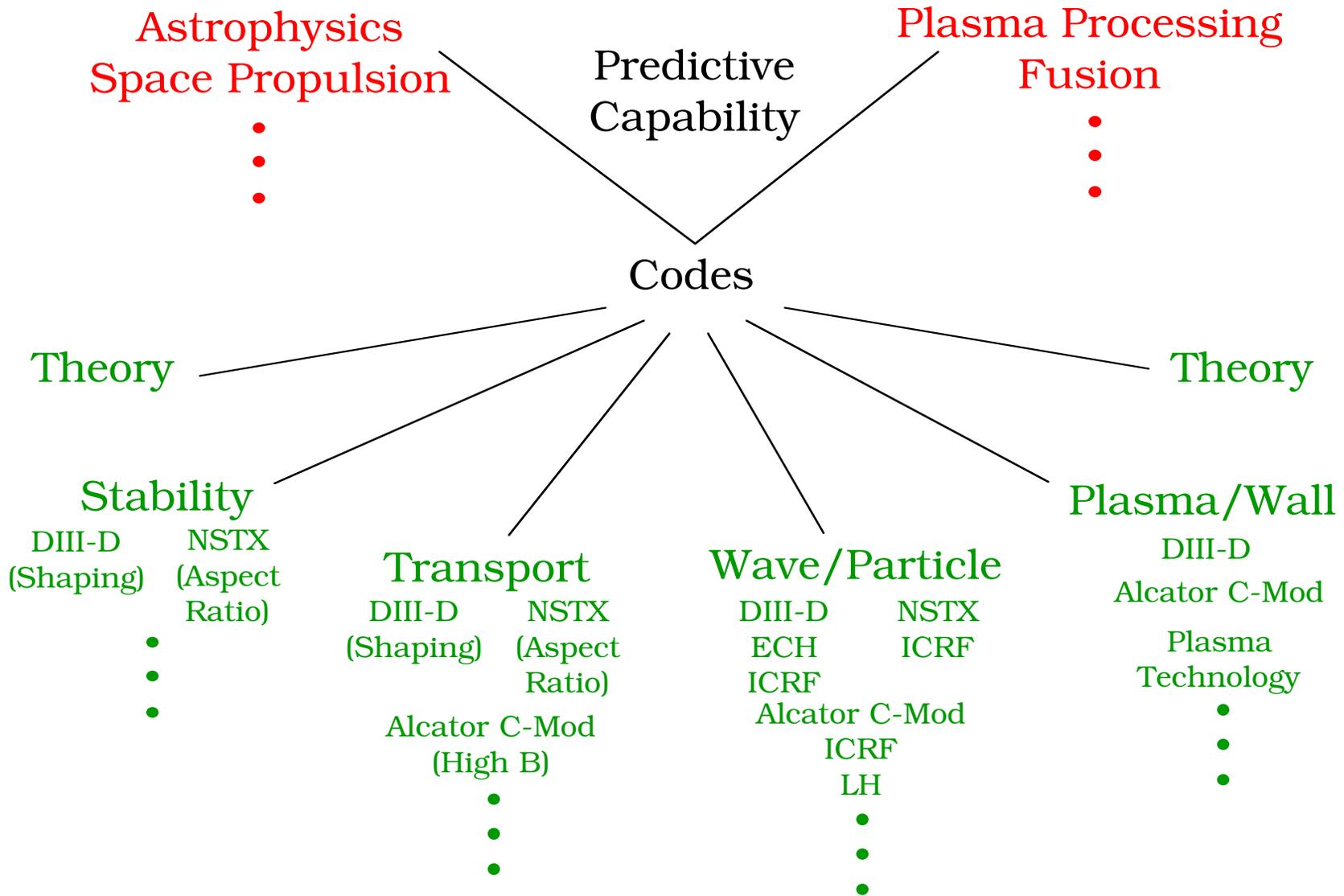
Prof. Donald Stokes, Dean, Princeton Woodrow Wilson School

Unlocking our Future: **Towards a New National Science Policy**



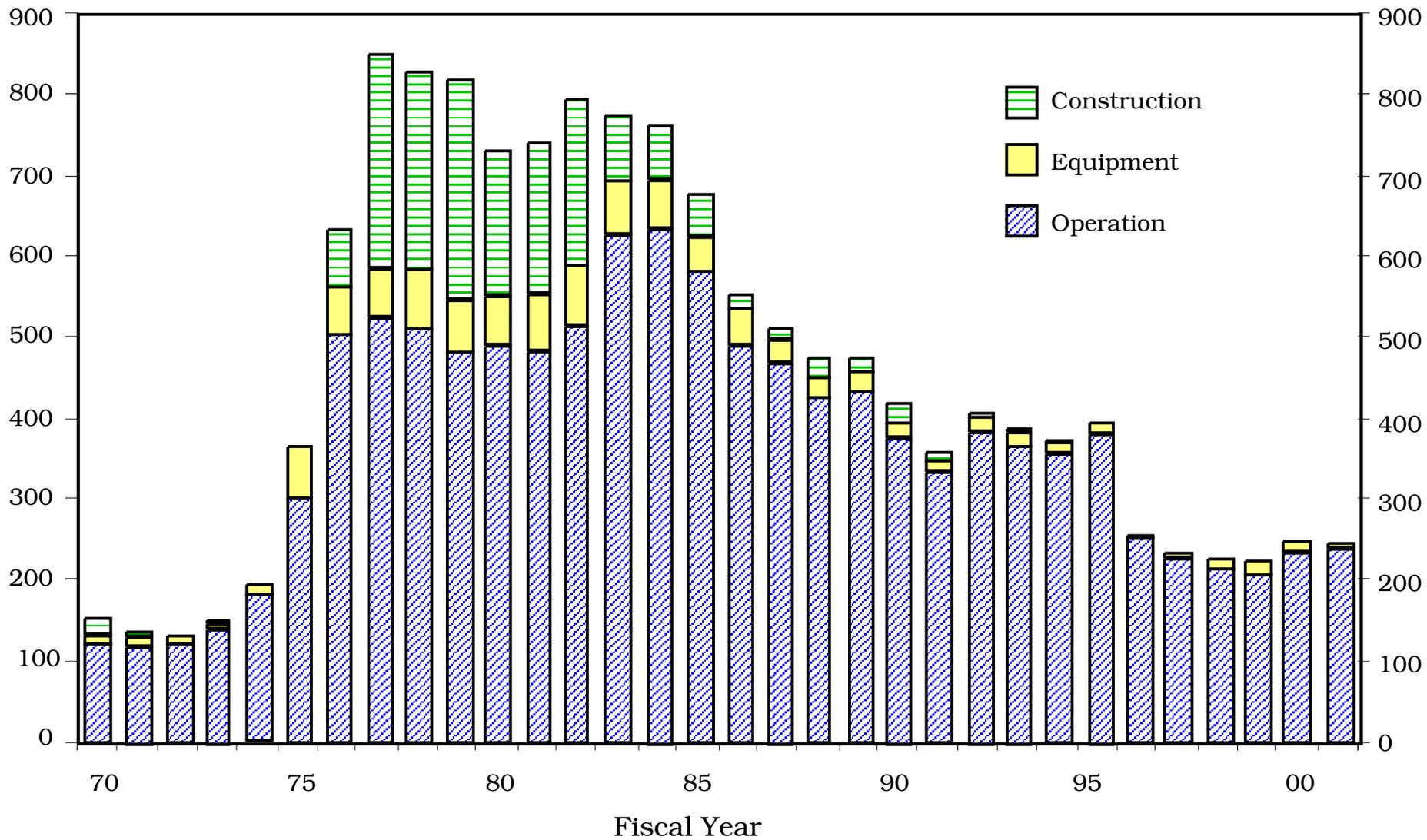
The Grand Challenge: **Excellent basic research enabling innovations to make fusion energy practical.**

Objective of the U.S. Fusion Energy Sciences Program

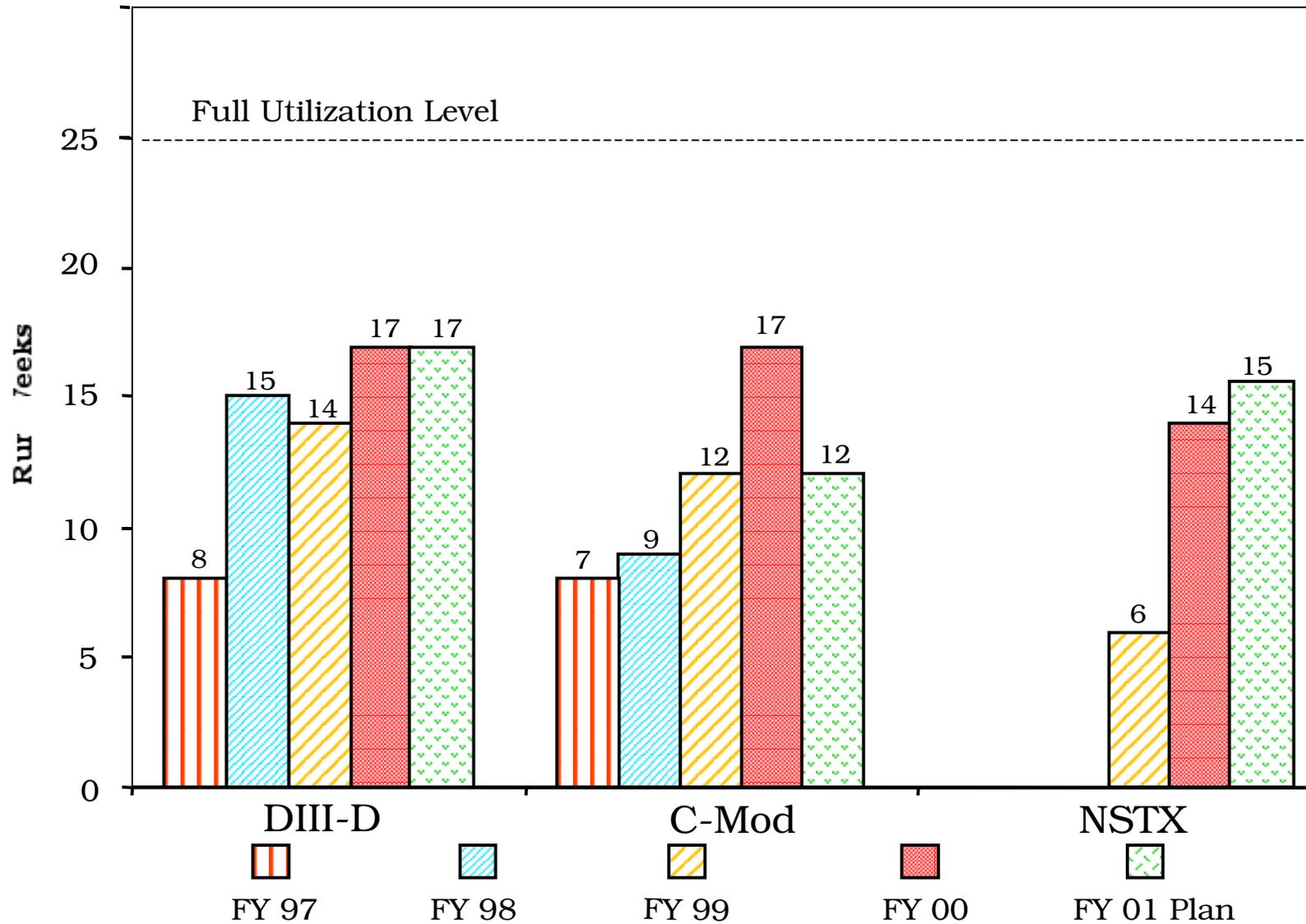


Fusion Energy Sciences Funding

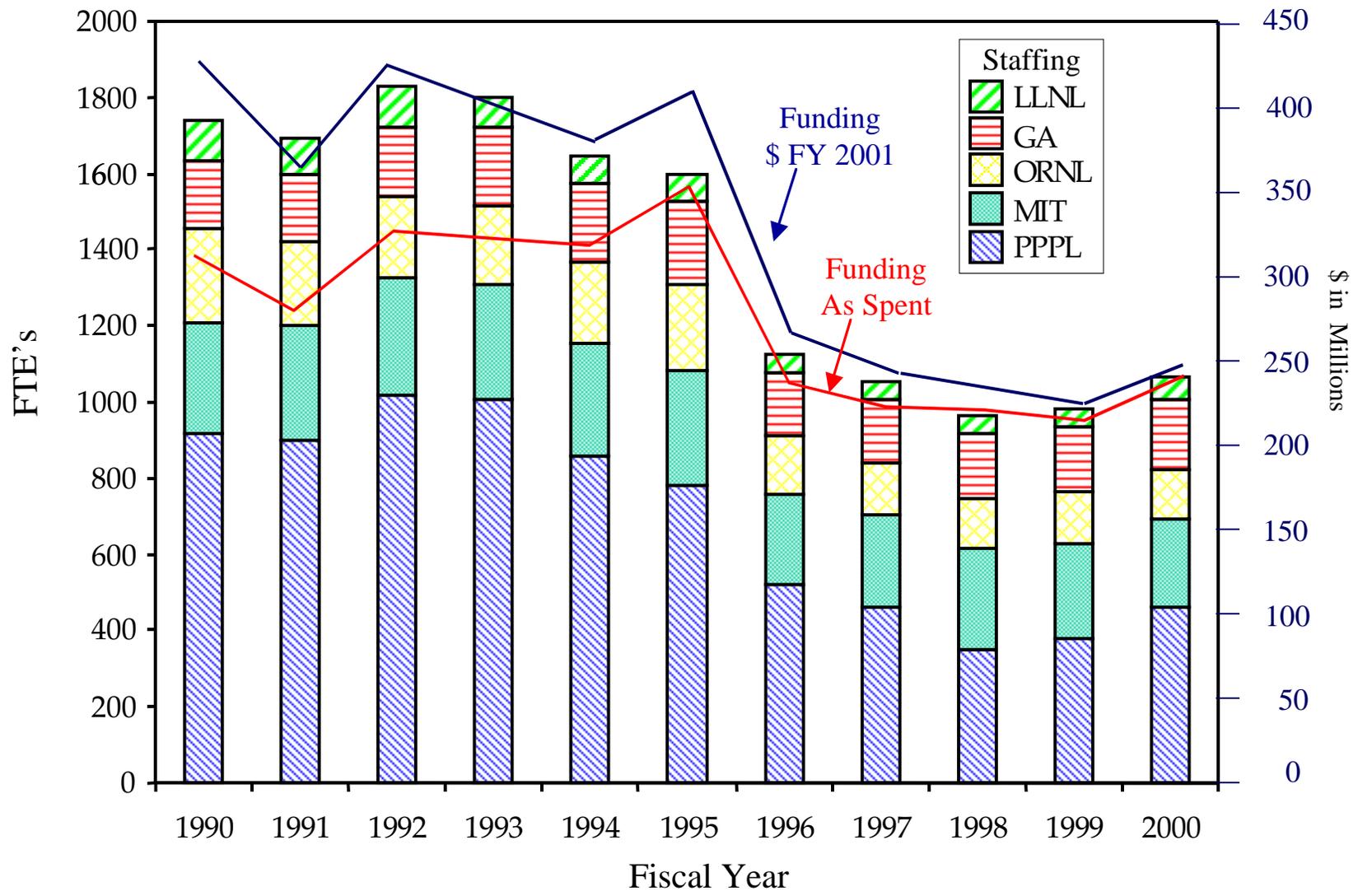
(FY 2001 \$ in Millions)



Major Fusion Facility Use



Staffing Trends at Major Fusion Contractors



Entering the 21st Century

Stronger Program

Broader portfolio

More innovative

Better science

More collaborative

Becoming better integrated