U.S. Department of Energy's
Office of Science

Theory and Computing Program

OFES Budget Planning Meeting

Office of Fusion Energy Sciences
Excellent Science Attractive Energy

www.ofes.fusion.doe.gov

Curt Bolton and Theory Team

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Theory Program Goal

- **Achieve a predictive scientific understanding of the behavior of high temperature plasmas**
  - **Provide the critical theoretical effort needed to understand present experiments and suggest new operating regimes or approaches to improve performance**
  - **Acquire improved analytic and computational capabilities in order to make refined comparisons between analytic theory, simulations, and experiments**
  - **Develop an integrated capability to predict the performance of future fusion experiments, especially a burning plasma experiment**

Research Performers

- The broad range of research themes provides opportunities for both large and small theory groups and individual investigators at national labs, universities, and industry
- Theory program funding currently supports 95-100 FTEs (including post docs)
- Number of FTEs declining in FY 2005 (due to nearly flat budget)

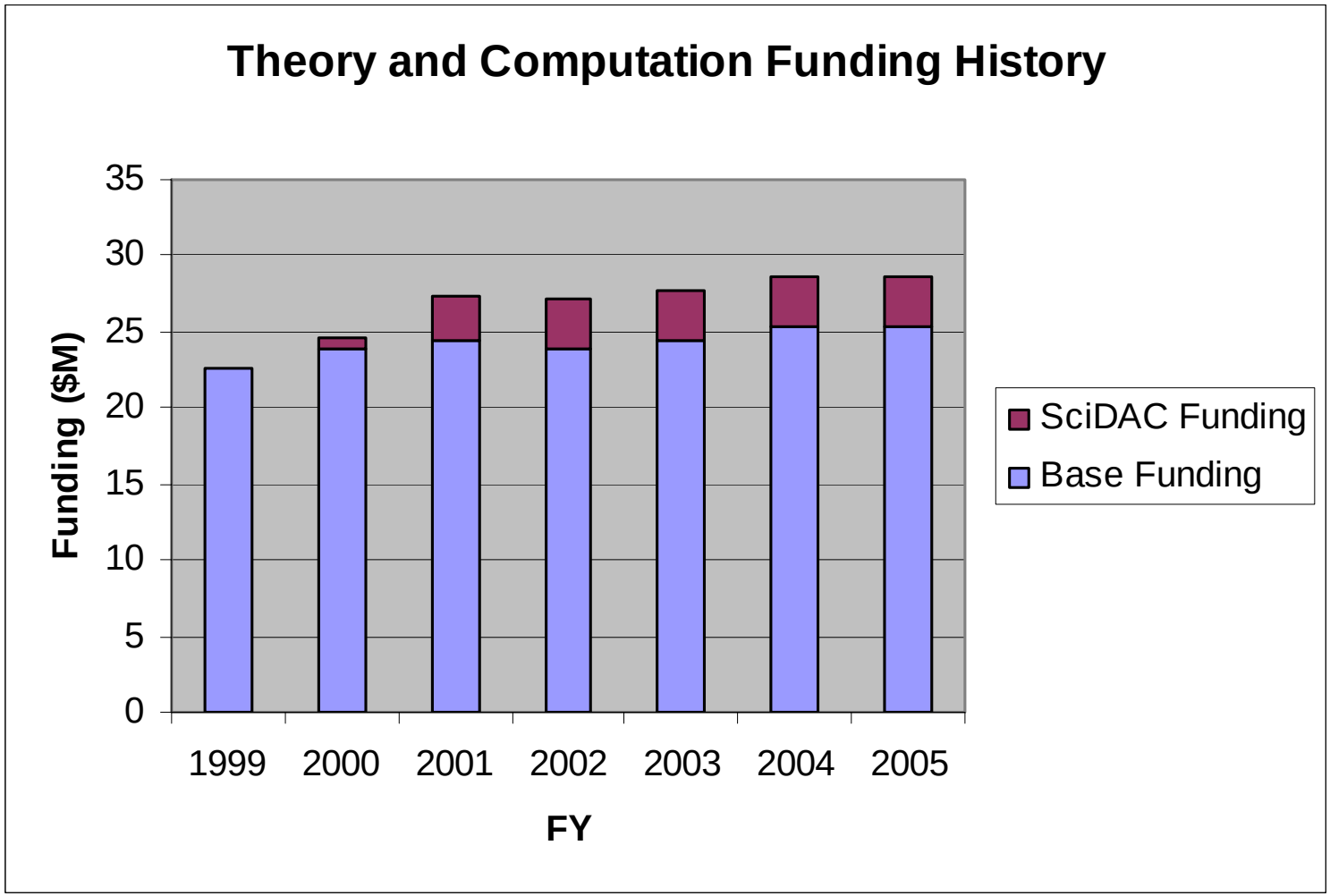
Theory Initiatives

- Large Programs produce work matrices and PEA by first of FY
- Started National Theory Seminar – improved communication
- Focus on constantly improving theory program
- Hope to have IPA to help with improvement initiatives

Results of Grant Reviews

	FY 2001	FY 2002	FY 2003	FY 2004
# Applications Received	23	48	36	39
# Applications Highly Rated	15	23	18	26
# Grants Funded	11	10	8 (+3)	19

Seven-Year Budget History



Theory and Computing Issues

- Key issue is how to advance topical integration in the theory program
- Will require new people
- Will require new funds
- Key to supporting a burning plasma experiment
- Fusion Simulation is planned as the vehicle to advance the integration!

Need for Advanced Simulation

- Analytic theory provides the central organizing concepts of fusion research--the ideas and quantities that frame all thinking about fusion physics
- Computational simulation is now an essential element
- SciDAC is making progress, but current simulations involve many simplifications, and key additional physics features must be included to make realistic simulations of fusion power-relevant plasmas
- The goal of the Fusion Simulation Project is to develop a fully integrated simulation capability over 15-year period at a cost of about $20M/yr

Backup Slides

Backup Slides:
Fusion Simulation Project