A Next Step Burning Plasma Experiment

The Litmus Test for Fusion Science

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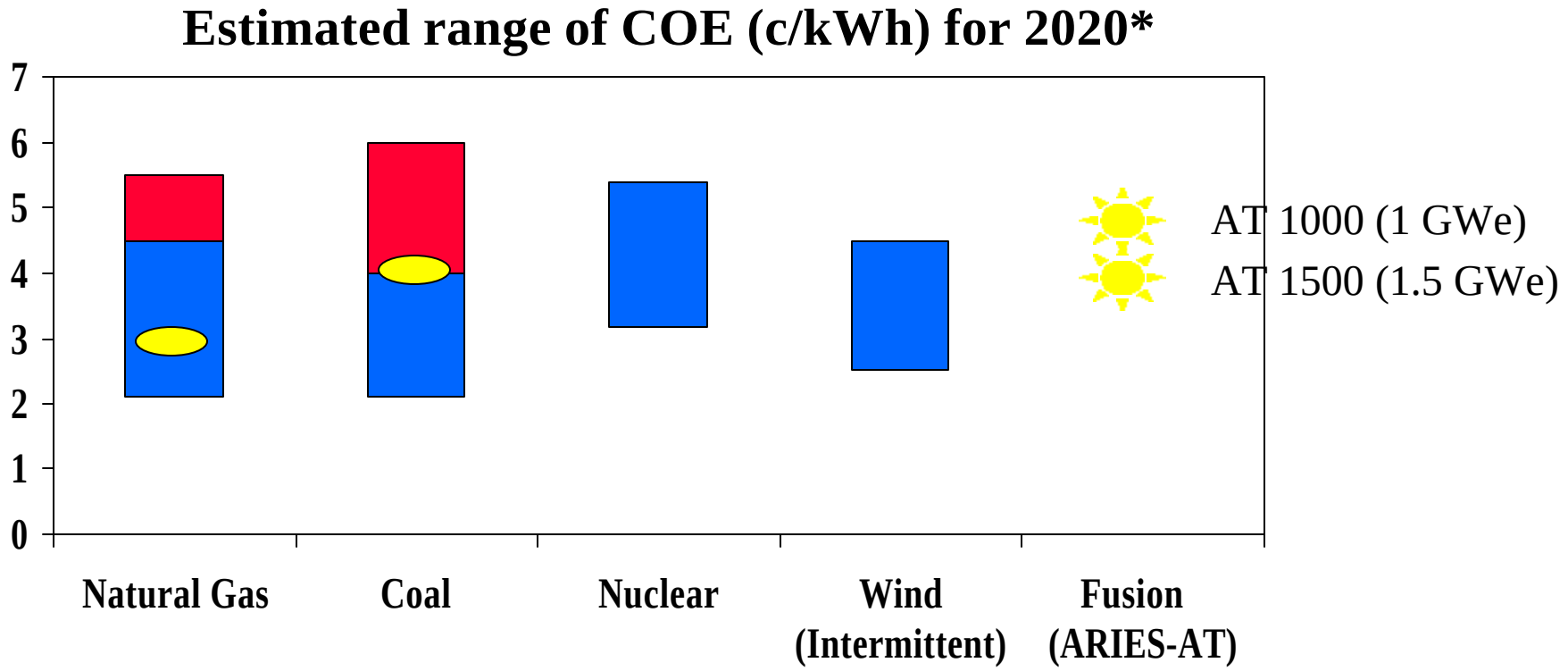
http://fire.pppl.gov

The Advanced Tokamak ARIES-AT could be Competitive with other Future Energy Sources



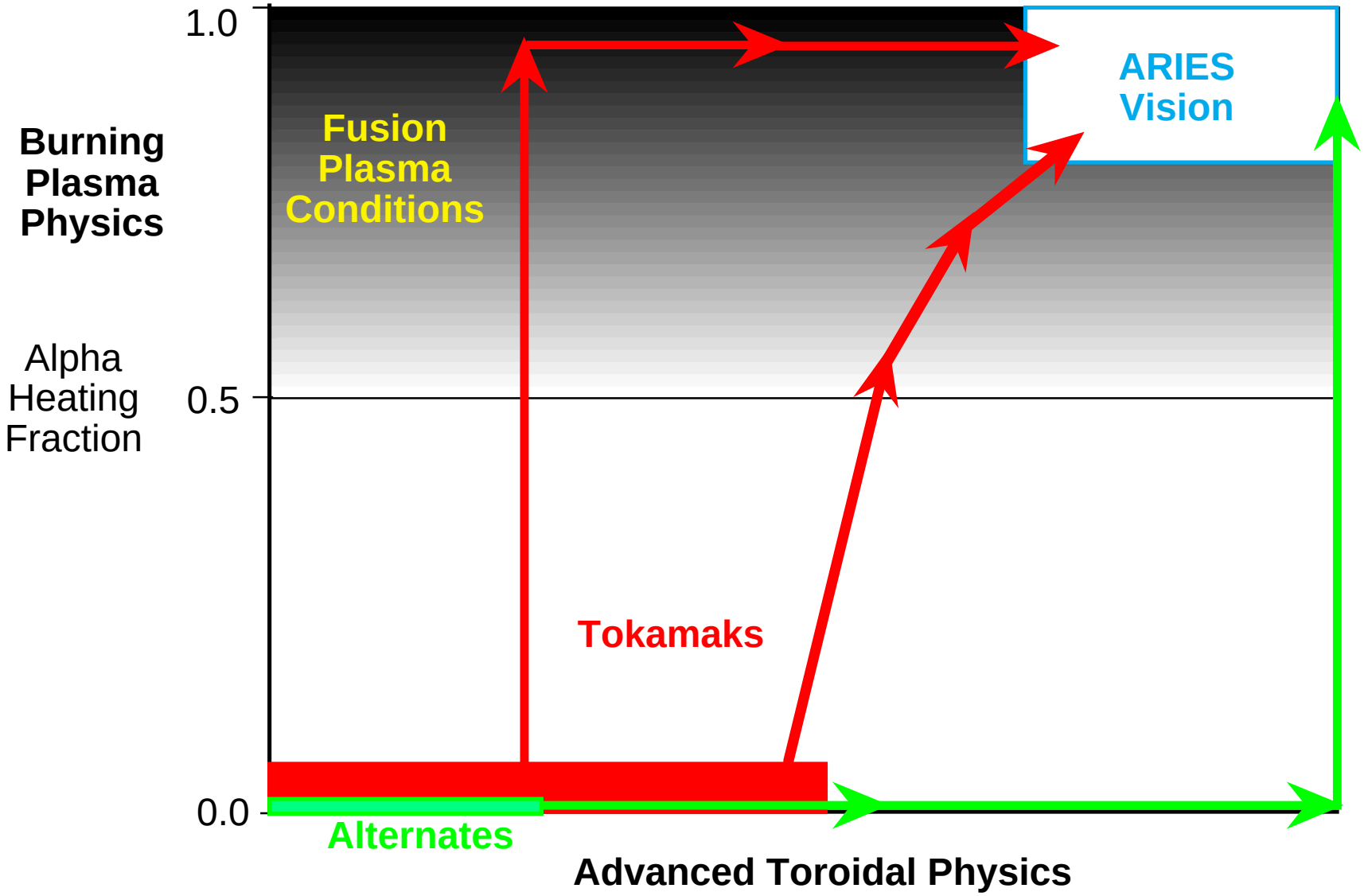
EPRI Electric Supply Roadmap (1/99):

- Business as usual
- Impact of $100/ton Carbon Tax.

- Estimates from Energy Information Agency Annual Energy Outlook 1999 (No Carbon tax).

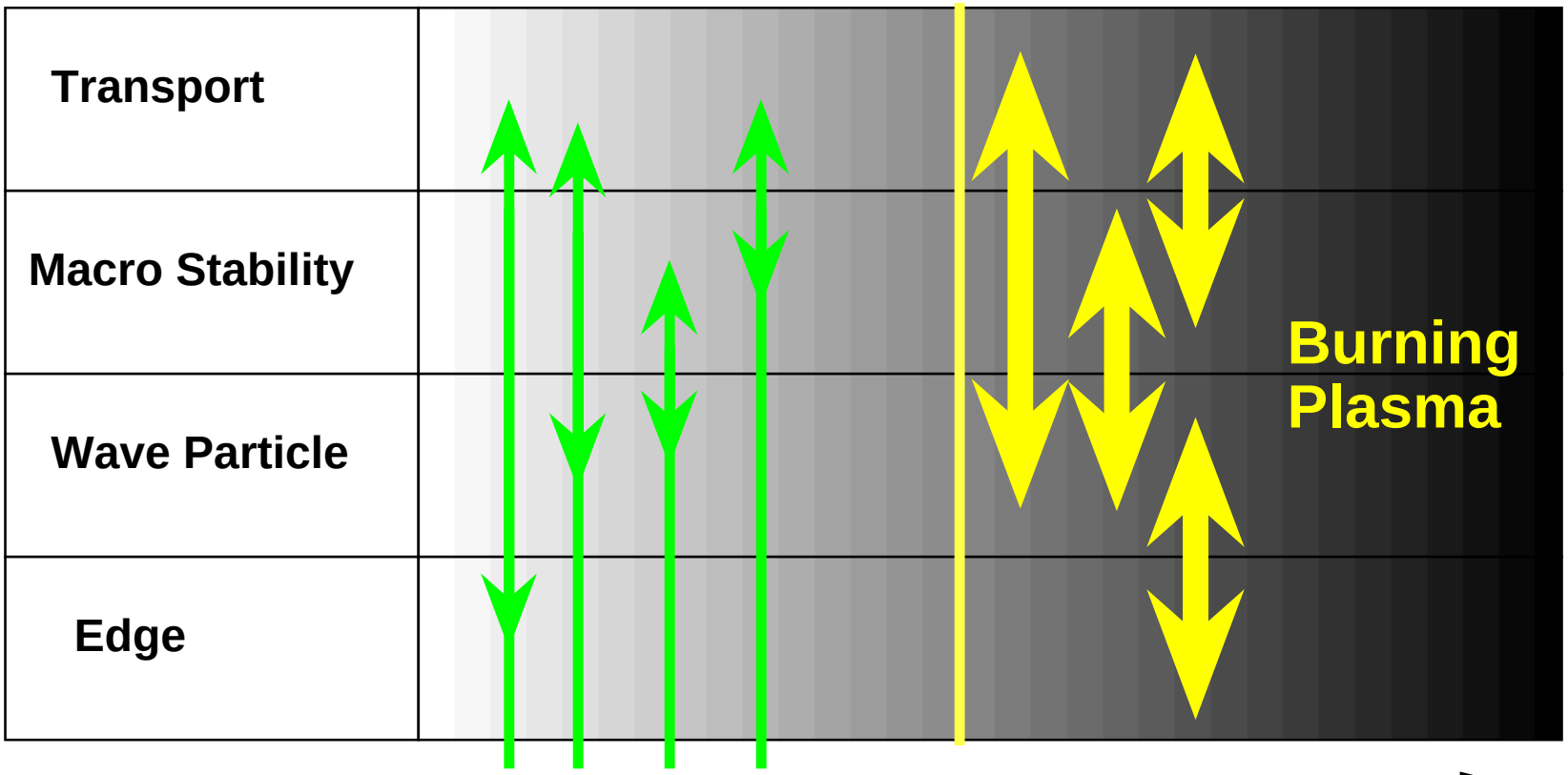
* Data from Snowmass Energy Working Group Summary.

Paths to Develop the Science for Attractive Fusion Energy

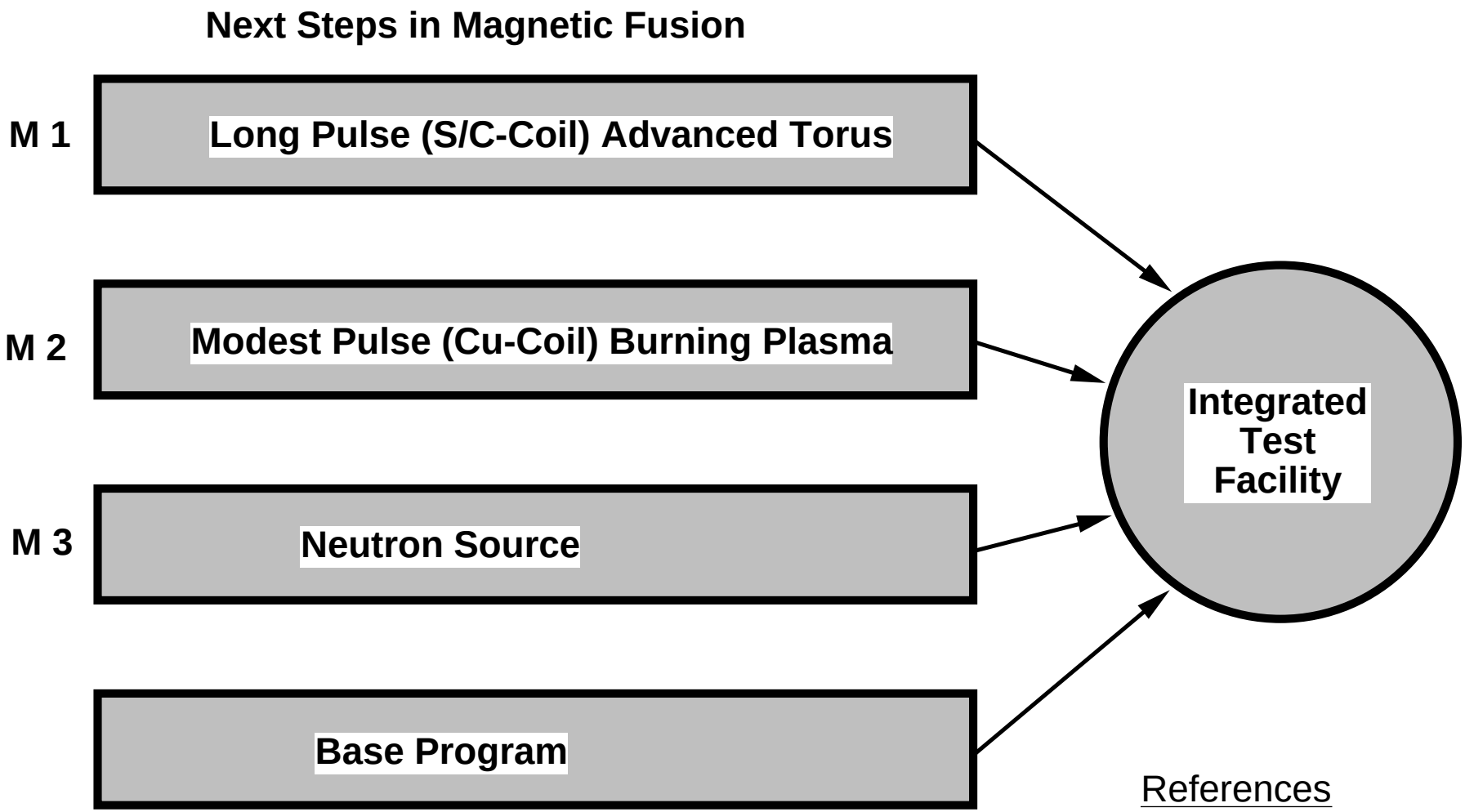


Magnetic Fusion Science

Issues - Strongly Coupled in a Fusion (Burning) Plasma

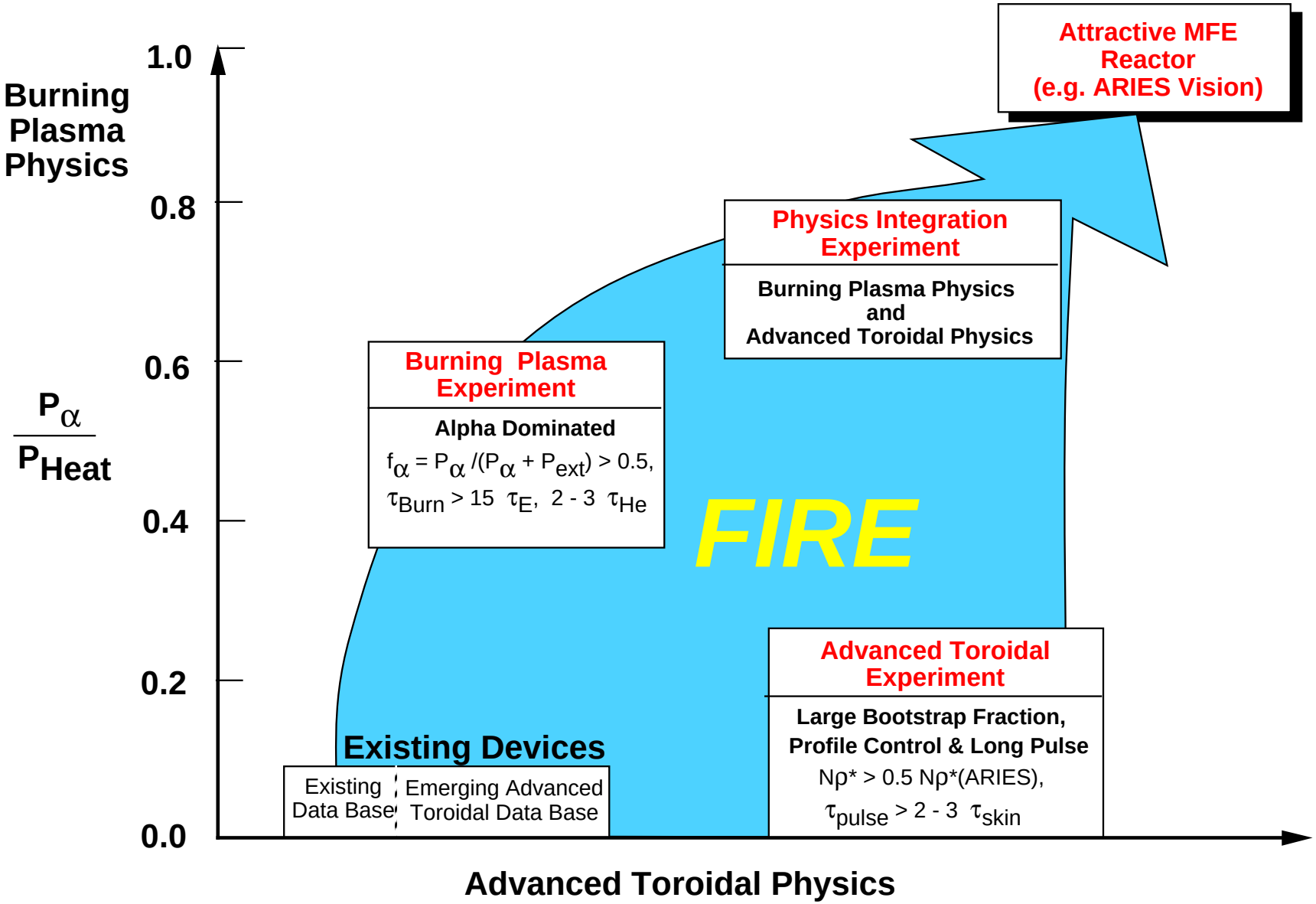


The Modular (Multi-Machine) Strategy



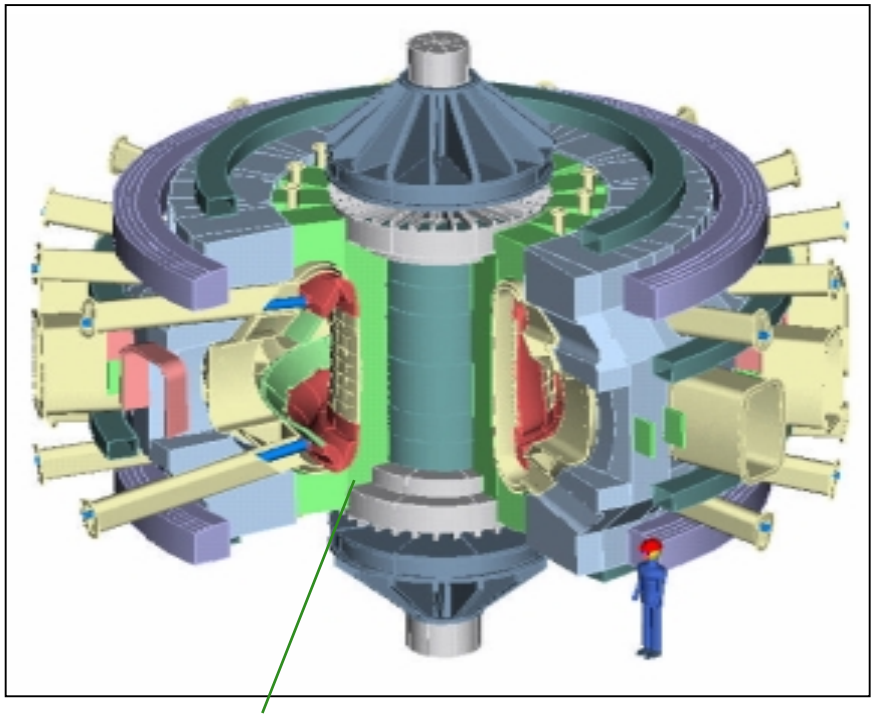
References
1987 - TPA
1990 - PHR
1995 - PCAST
1997 - DMM
1998 - MSN

Stepping Stones for Resolving the Critical Fusion Plasma Science Issues for an Attractive MFE Reactor



The "Old Paradigm" required three separate devices, the "New Paradigm" could utilize one facility operating in three modes or phases.

Fusion Ignition Research Experiment (FIRE)



Design Goals

- R = 2.0 m, a = 0.525 m
- B = 10 T, (12T)*
- W_{mag} = 3.8 GJ, (5.5 GJ)*
- I_p = 6.5 MA, (7.7 MA)*
- $P_{alpha} > P_{aux}$, P_{fusion} ~ 220 MW
- Q ~ 10, τ_E ~ 0.55s
- Burn Time ~ 20s (12s)*
- Tokamak Cost ≤ $0.3B

  Base Project Cost ≤ $1B

* Higher Field Option

Attain, explore, understand and optimize alpha-dominated plasmas to provide knowledge for the design of attractive MFE systems.

Laboratories are Needed to Explore, Explain and Expand the Frontiers of Science

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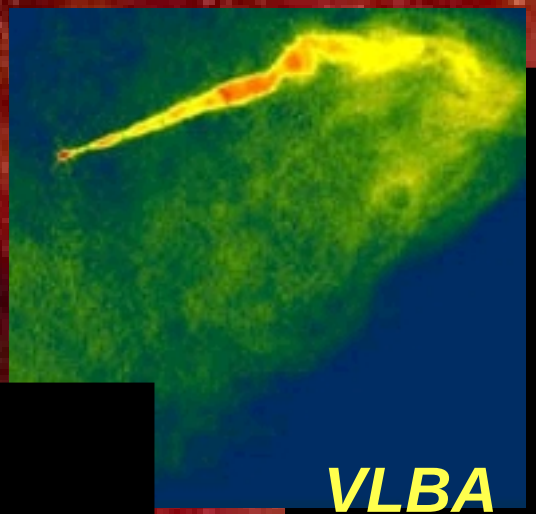
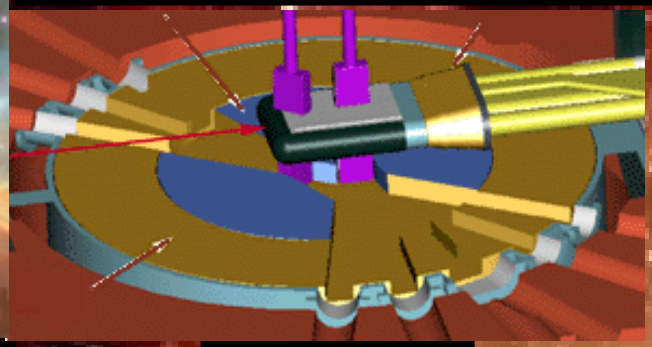
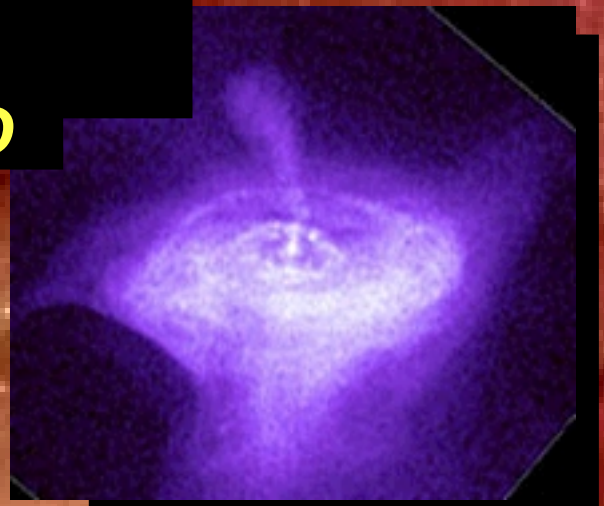


VLBA

HST (NGST)



SNS



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