General Issues for Selection of QOS Plasma and Coils

J. F. Lyon

QOS Project Meeting

Sept. 19, 2000

Purpose of QOS Project Meeting

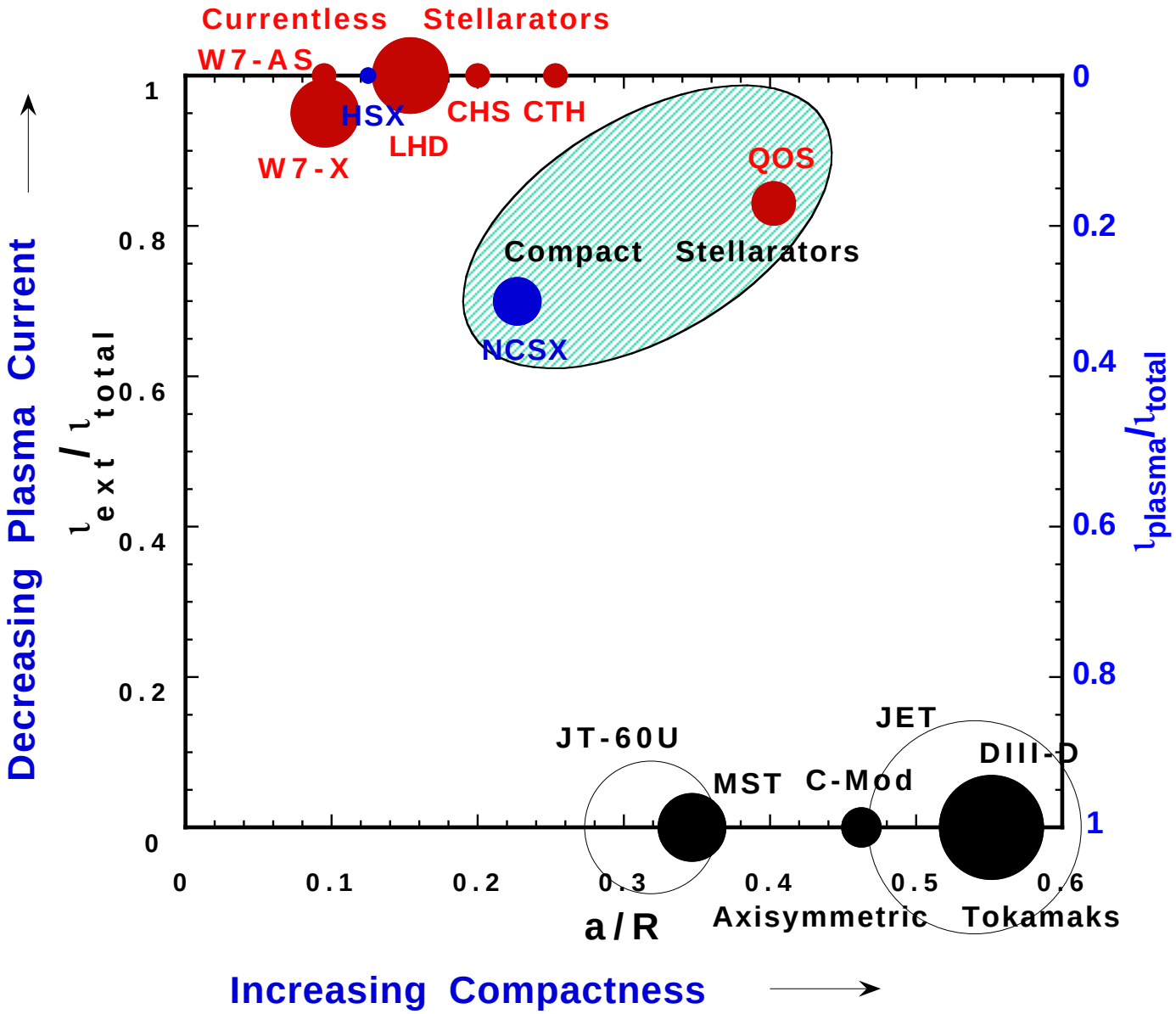
- Discuss status of QOS studies
  - physics and engineering
- Review options for CE experiment

⇒ Choose reference plasma and coil configuration -- needed for
  - engineering, cost & schedule assessment
  - further physics assessments
  - benchmark for alternatives to reference
  - IAEA and APS preparations
- Discuss work needed for Dec. 18-20 NCSX PVR and March QOS Reviews

Considerations in Choosing Plasma and Coil Configuration # 1

- **Programmatic**
  - can contribute new physics, complement NCSX
  - connect to compact stellarator & reactor vision
  - relation to other stellarators
  - B, R, $P_{heating}$ appropriate for CE experiment
- **Physics performance**
  - flux surface quality, β capability, bootstrap current for equilibrium studies
  - neoclassical confinement margin, energetic particle losses for transport studies

QOS Role -- Explore Very-Low-Aspect-Ratio Low-Current Toroidal Confinement



Considerations in Choosing Plasma and Coil Configuration # 2

- **Modular coil feasibility**
  - coil-coil spacing, minimum bend radii
  - room inboard for TF coil legs and OH solenoid
- **Experimental needs**
  - quality of flux surface reconstruction
  - magnetic configuration flexibility
  - plasma-coil spacing
  - access for plasma heating and diagnostics
  - capacity for particle and power handling

Agenda

- Main Features of Configuration Candidates -- A. Ware
  - 2 and 3 field period low-bootstrap current, lower β configurations
  - 2 and 3 field period higher bootstrap, higher β configurations
- Kink and vertical stability for higher-bootstrap configurations -- G.Y. Fu
- Transport Assessments for Selecting Ref. Configuration -- D. Spong
  - electron and ion neoclassical transport, energetic orbit losses
- Modular Coils Assessments for Configuration Candidates
  - NESCOIL sheet current calculations -- P. Valanju
  - COILOPT modular coils for candidate configurations -- D. Strickler
  - vacuum and β = 1.6% flux surfaces, configuration flexibility -- J. Lyon
- Engineering Issues Affecting Configuration Choice -- B. Nelson
  - modular coils, TF and PF coils, vacuum vessel
- Experimental Considerations for Configuration Choice
  - heating and current drive issues -- D. Rasmussen
  - vacuum, PMIs, and divertor issues -- P. Mioduszewski
- Issues, Choices, and Next Steps -- all