

FESAC Proof of Principle Sub-Panel Report
26 March 2001
PPPL, Princeton, NJ

In August 1999 the FESAC Proof of Principle (PoP) subpanel met to determine the readiness of three concepts for Proof of Principle status. Among these was the Compact Stellarator Program (CS). After review, the PoP subpanel did not recommend approval of the CS as a PoP program because of an important technical issue that needed to be resolved; specifically, the conceptual design embodiment (NCSX) needed to exhibit robustness of the equilibrium configuration throughout the plasma evolution. Nevertheless, the PoP subpanel stated it was confident that the Compact Stellarator can become an important PoP program and therefore recommended that the NCSX design effort complete an optimized design addressing the issue of robustness.

The PoP Panel reconvened 26 March 2001 at PPPL to review the NCSX design as part of a broader Physics Validation Review. The NCSX design team has made significant progress on validating the robustness of the QAS equilibria over a broad parametric range of pressure and current profiles, beta values, and start-up scenarios. Based on the information presented to the panel, it was concluded that the design has adequately addressed the issue of robustness of the equilibrium configuration throughout the plasma evolution. Therefore we conclude that the CS is ready for PoP designation.

Although we recommend that NCSX be designated as ready for PoP status, we recognize that construction would be a relatively costly investment over many years by the Fusion Energy Sciences Program. Therefore, we recommend FESAC and the OFES address the larger programmatic issues to determine whether or not to proceed with construction of NCSX and, if so, on what time scale. These include the issue of program balance within available fusion program budgets, needs of present element in the program, and opportunities for other new starts and collaborations.