Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Design of Divertor Scraper Elements for the W7-X Stellarator[1]
JEFFREY HARRIS, ARNOLD LUMSDAINE, JOHN CANIK, JEREMY LORE, DEAN MCGINNIS, Oak Ridge National Laboratory, ALAN PEACOCK, FRED HURD, JEAN BOSCARY, JOACHIM GEIGER, Max-Planck Institut für Plasmaphysik, JOSEPH TIPTON, Oak Ridge National Laboratory — A PPPL/ORNL/LANL team is partnering with the Max-Planck Institut für Plasmaphysik in the Wendelstein 7-X (W7-X) stellarator project. W7-X is a large superconducting, steady-state stellarator (R = 5.5, a = 0.5, B = 3T) with P =15-30 MW that will begin operation in 2015. The US team is focusing on control of the magnetic configuration and divertor heat flux. The W7-X divertor consists of cooled CFC plates arranged as a magnetic island divertor outside the last closed flux surface. While the W7-X configuration is optimized to minimize both Pfirsch-Schlüter and bootstrap currents, the ∼30 sec evolution of the plasma to its final equilibrium drives bootstrap currents which transiently alter the distribution of divertor heat flux. This necessitates the addition of 10 actively cooled scraper elements (dimensions ∼0.2 m x 1 m) capable of absorbing localized heat fluxes < 12 MW/m^2. ORNL/IPP are developing an engineering design for the scraper elements using ITER CFC monoblock technology.

[1]Work supported by US Department of Energy.

Jeffrey Harris
Oak Ridge National Laboratory

Date submitted: 26 Jul 2011 Electronic form version 1.4