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First steps in investigating fast ion confinement on the HSX stellarator[1] E.M. SCHILLING, K.M. LIKIN, F.S.B. ANDERSON, D.T. ANDERSON, Univ of Wisconsin, Madison — The Helically Symmetric eXperiment (HSX) is a Quasi-Helically Symmetric (QHS) stellarator that has been successfully optimized for improved neoclassical confinement, but fast ion confinement has not yet been investigated. Fast ion studies have been performed on similar experiments, such as the Madison Symmetric Torus (MST)[2] and the Compact Helical System (CHS)[3], but not yet for a QHS geometry. A 20 kV, 0.5 MW, 1.2 ms beam system has been adapted for use on HSX to perform such a study. By calculating the charge exchange and electron/proton impact cross sections for an approximated HSX plasma, a beam attenuation of at least 15% has been predicted. The density of beam ions has then been calculated together with a target ion density assuming some fast ion confinement, and a resulting D-D fusion rate has been predicted to produce no less than $1x10^6$ neutrons/sec overall. Once the beam system is mounted onto HSX, this neutron flux will be measured by a neutron detector and a fast ion confinement time will be inferred. Currently, a test vacuum chamber with basic diagnostics is being constructed to verify the beam's published performance characteristics.

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[2]G. Fiksel et al., PRL **95**, 125001 (2005).
[3]M. Isobe et al., RSI **68**, 532 (1997).

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