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Superthermal electron dynamics in HSX stellarator.[1] A.E. ABDOU, A. ALMAGRI, D.T. ANDERSON, K.M. LIKIN, J.N. TALMADGE, HSX Plasma Laboratory, UW-Madison — Superthermal electrons are generated in HSX stellarator during two different processes, (1) magnetic field ramping and (2) 2^{nd} harmonic X-mode ECRH. The normal magnetic configuration is Quasi-Helically Symmetric (QHS). With a set of auxiliary coils, the quasihelical symmetry can be broken (Mirror and AntiMirror configurations). In this work the resolved hard x-ray emission is analyzed using a CdZnTe detector. The hard x-ray spectra were accumulated in a series of similar ECRH discharges. The behavior of the superthermal electrons has been studied for densities in the range of 0.1 to 1.0 x 10^{12} cm^{-3}. The magnetic configuration has also been altered in order to determine the effect of magnetic ripples on characteristic energies and densities of superthermal electrons. Pulse height analysis of the hard x-ray emission shows the presence of x-ray photons with energies as high as 1 MeV during the microwave discharge. The Hard x-ray emission shows inverse nonlinear density dependence and higher x-ray intensities and photon energies in QHS than MIRROR and AntiMirror configurations. The time evolution of the hard x-rays shows enhanced superthermal electron confinement in QHS than the Mirror configuration. Calculations of single particle heating and drift indicated that the improved confinement in the quasisymmetric configuration is responsible for the more efficient heating of superthermal electrons.

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