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Electron temperature determination in a sheared- flow- stabilized Z-pinch using soft X-rays[1] YUE ZHANG, BRIAN NELSON, Zap Energy Inc., TOBIN WEBER , URI SHUMLAK, The University of Washington, LUIS DELGADO-APARICIO, BRENTLEY STRATTON , Princeton Plasma Physics Laboratory — The sheared-flow-stabilized Z pinch is a promising concept for economical thermonuclear fusion. The Fusion Z-pinch Experiment (FuZE) has demonstrated sustained neutron production for 5-10 μs, along with reported plasma parameters of density 10^{17} cm^{-3} and ion temperature 1 keV, measured by spectroscopy and force balance. An independent measure of electron temperature is made to further investigate energy confinement in the Z pinch. A compact multi-energy soft X-ray diagnostic has been developed for time, energy and space-resolved measurements of the soft-X-ray emissivity in FuZE Z-pinch plasmas. The diagnostic is simple and robust (no front-end optics). The distinct energy ranges are determined by beryllium foils with different thicknesses. The electron temperature can be obtained by modeling the slope of the continuum radiation from ratios of the available brightness and inverted radial emissivity profiles over multiple energy ranges. The design and setup of the diagnostic, along with obtained experimental data, and analysis results will be presented.

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