Operational status of the compact high-flux linear plasma device SPARROW

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Linear plasma devices (LPDs) have been a vital tool to sharpen our understanding of plasma wall interactions in fusion devices. The uniqueness of our LPD SPARROW, abbreviated for Steady-state Plasma Apparatus foR Research Of Wall materials, lies in that it produces various plasmas in the 10^{23}-10^{24} $m^{-2}s^{-1}$ flux range confined by conventional magnets. The design and discharge characteristics of it will first be reported.

The function of SPARROW is mainly twofold. First, it serves as a test platform for the development of our flagship LPD SWORD, such as optimizing the cascaded arc source, quantifying the target Langmuir probe, and practicing plasma diagnostics. Second, we use it to investigate plasma material interactions, including surface modification of tungsten by He plasma exposure, sputtering of tungsten by Ne plasmas, and damage in 3D printed tungsten alloys under H plasma exposure. Such examples will be used to illustrate the versatility of SPARROW.

Finally, planned upgrades for SPARROW including a laser interferometer, an edge-localized mode simulation system, and a sputtering resistant target holder will be shared.

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