Characterization of the W7-X scrape-off layer using reciprocating probes

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The W7-X scrape-off layer (SOL) with its characteristic magnetic island chain has been investigated using electric probes mounted on a reciprocating manipulator close to the outboard mid-plane. A survey of the W7-X configuration space shows that the presence and particular topology of magnetic islands significantly affects the SOL profiles of electron temperature, density, electric field and plasma flows. Particularly relevant for divertor operation, very wide SOL heat flux profiles have been observed in some magnetic configurations, which we link to the presence of magnetic islands. In these situations, the islands can feature a local minimum of the plasma potential accompanied by a direction reversal of $E \times B$ driven dynamics measured by probe arrays.