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Magnetic islands and confinement in the H-1NF heliac[1] SANTHOSH T. A. KUMAR, BOYD D. BLACKWELL, MICHAEL G. SHATS, JOHN HOWARD, The Australian National University, JEFFREY H. HARRIS, Oak Ridge National Laboratory — Magnetic islands in fusion devices have serious impacts on the confinement properties, including enhancement of radial transport and deterioration of plasma confinement. However, there is experimental evidence that under certain conditions, islands can induce transport barriers and thus improve confinement. Present understanding of the conditions for either deterioration or improvement in plasma confinement due to magnetic islands is far from complete. The H-1NF heliac in the Plasma Research Laboratory, ANU, provides an excellent opportunity to conduct controlled experiments on magnetic islands. The flexible coil system of H-1NF allows the magnetic configurations to vary over a wide range to accommodate or avoid major rational surfaces and islands. Our recent experiments in a low temperature RF-produced Argon plasma indicate that, under our experimental conditions, magnetic islands near the core may serve as pockets of improved plasma confinement regions. In the presence of these islands, the radial electric field near the core jumps to a large positive value, reversing its direction within the island, producing a strong electric field shear layer.

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Santhosh T. A. Kumar
The Australian National University

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