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## Ion internal transport barrier in neutral beam heated plasmas on HL-2A

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Ion internal transport barriers (iITBs) are first observed in neutral beam injection (NBI) heated plasmas at the HL-2A tokamak. The position of the barrier foot, in the stationary state, coincides with the  $q = 1$  surface within its uncertainty of measurement. iITBs can develop more easily at the beginning of NBI heating. Also, iITBs are unstable for the sawtooth plasma. Simulations reveal that the thermal diffusivity of ions inside the barrier can be as low as the neoclassical level. It is observed that the toroidal flow shear in the stationary iITB state reaches the level required for suppressing the ion temperature gradient mode (ITG) instability, which indicates the important role of flow shear in sustaining the iITB.

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China

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