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## EX/P6-12: Investigation of the Role of Energetic Particle in the Driving of Long-lived Saturated Internal Mode on HL-2A Tokamak

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Long-lived saturated internal mode (LLM) in HL-2A tokamak, observed during neutral beam injection (NBI) with weakly reversed or broad low magnetic shear, is considered as a pressure-gradient driven MHD mode triggered by energetic particles. When the LLM occurs, a reduction in the electron density and the plasma stored energy, and fast ion losses are usually observed. The observed LLM appears with the safety factor profile has a weak shear in a broad range with  $q_{min}$  around unity. The ideal interchange can become marginal stable due to the weak magnetic shear if  $\nabla q = 1 - q_{min}$  reaches a critical value, then it can be excited by the energetic particles during NBI. In HL-2A experiments, it is observed that LLMs can be suppressed by electron cyclotron resonant heating (ECRH), and by applying supersonic molecular beam injection (SMBI) or cluster jet injection (CJI) effectively. The control of LLMs may also be related to the change of  $\nabla q$  or the pressure profile induced by the local heating or fuelling.

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### Collaboration (if applicable, e.g., International Tokamak Physics Activities)

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