**Compatibility of pronounced detachment with improved confinement on HL-2A tokamak**

Ting Wu1, Min Xu1, Zhuo Wang1, Lin Nie1, \*, Zhanhui Wang1, Jinming Gao1, Yihang Chen1, Yiren Zhu1, Yi Zhang1, Liang Liu1, Dong Li1, Kai Zhang1, Rui Ke1, Xiaoxue He1, Zengceng Yang1, Xin Yu1, Na Wu1, Zhihui Huang1, Kaiyang Yi1, Weice Wang1, Longwen Yan1, Yonggao Li1, Ting Long1, Wenjing Tian1, Zhe Wang1, Laizhong Cai1, Yi Yu2

1Southwestern Institute of Physics, Chengdu 610041, People’s Republic of China

2Sino-French Institute of Nuclear Engineering and Technology, Sun Yat-sen University, Zhuhai 519082, China

E-mail: [wuting@swip.ac.cn](mailto:wuting@swip.ac.cn)

**Abstract**

This paper investigates the compatibility of pronounced detachment with improved confinement based on the NBI-heated HL-2A L-mode plasma with low-density. Through impurity seeding, radiation becomes higher at plasma edge and causes edge cooling after pronounced detachment. Turbulent transport is examined in detail by experiments and global integrated simulations. Ion dominant turbulent transport decreases at normalized minor radius and ion temperature increases at . Edge turbulence and turbulent transport through ion channels decrease significantly, which could result from reduced free energy source due to edge cooling. The reduced edge turbulent transport benefits to decrease the power entering the SOL/divertor. The decreased edge outward transport and increased core electron density and ion temperature make major contributions to the improved plasma confinement after pronounced detachment.

Keywords: turbulence spreading, heat flux width, turbulent transport, shear