Contribution ID: **85** Type: **Oral**

Spin-Polarized Proton-Boron (p-^{11}B) Fusion: Pathways to Clean Energy

Proton-boron (p-^{11}B) fusion is widely recognized as a promising candidate for future clean energy due to its advantages of abundant fuel, inherent safety, and minimal neutron emissions. However, the practical realization of p-^{11}B fusion faces significant challenges, primarily due to its stringent ignition conditions and relatively low reaction cross-section. Recently, spin polarization has emerged as a potential method to enhance the reaction rate and improve the feasibility of p-^{11}B fusion. This presentation reviews the current status and recent progress in p-^{11}B fusion research, emphasizing the role of spin-polarized fuel in improving reaction efficiency, and discussing the innovative approaches proposed by ENN Energy Research Institute using spherical torus (ST). Additionally, we highlight theoretical and experimental studies on spin-polarized p-^{11}B fusion, including cross-section measurements, fuel (especially boron) preparation, plasma generation and sustainment. The synergy between advanced magnetic confinement configurations, such as ST, and spin-polarized fuel is identified as a promising pathway toward commercial fusion energy. Finally, we outline future research directions and collaborative opportunities within the spin-polarization physics community to accelerate the development of p-^{11}B fusion as a viable energy source.

Primary author: Dr LI, ZHI

Presenter: Dr LI, ZHI

Track Classification: Application of spin and nuclear polarization techniques