# AAPPS-DPP2025 Invited/Plenary Nomination Form

0. **Conference(s): select option 1) or 2)** (strikethrough or delete)
   1) Individual speaker Nomination: reply to 1, 2, 3, 4, 5, 6
   2) Session Nomination (only for Topical Session): reply to 1, 2, 4, 5, 6

1. **Recommender's / Organizer's name, E-mail, and affiliation**
   Name: Xiang Jian
   E-mail: xjian@ipp.ac.cn
   Affiliation: Institute of Plasma Physics, Chinese Academy of Science

2. **Session category: MF1**: Magnetic Fusion (core)

3. **Type:** Invited

4. **Speaker(s):**
   Name(s): Xu Yang
   E-mail(s): yangxu@ctbu.edu.cn
   Affiliation(s): Chongqing Technology and Business University

5. **Rationale (or session title and scope)**:

The control of Edge Localized Modes (ELMs) using Resonant Magnetic Perturbations (RMPs) is a critical research topic in the field of Tokamak physics research. This study systematically investigates the effects of three-dimensional resonant magnetic perturbations (RMPs), the plasma boundary configuration, and the safety factor at the 95% flux surface ($q_{95}$) on plasma response. The findings have been successfully applied to the analysis and interpretation of experimental data from internationally renowned tokamak devices such as EAST and DIII-D. Additionally, the study introduces an optimal helical resonant magnetic perturbation coil design. Compared to conventional window-frame ELM control coils, the optimal helical coils require 2–4 times less current to achieve the same ELM control performance, as quantified by various figures of merit adopted in this work. The results demonstrate a promising pathway toward effective ELM control using RMP fields in tokamak plasmas.

6. **Short abstract of each talk**

Authors: Xu Yang*, Yueqiang Liu*, Li Li, Guoliang Xia, Yuling He and Lina Zhou

Title: Optimized RMP spectrum design towards robust ELM control

Short Abstract: The high-confinement mode (H-mode), characterized by edge-localized modes (ELMs), is the primary operational regime for achieving enhanced plasma confinement in tokamaks. However, research has shown that Type-I ELMs pose a significant threat to the integrity of plasma-facing components in next-generation tokamak reactors. Notably, the current ITER design estimates that its first wall and divertor systems can withstand only about 20% of the thermal loads produced during Type-I ELM events. This study based on MARS-F systematically examines the impact of three critical parameters—the spectral structure of three-dimensional resonant magnetic perturbations (RMPs), the plasma boundary configuration, and the safety factor at the 95% flux surface ($q_{95}$)—on the effectiveness of RMP-based ELM control in tokamak plasmas. Additionally, the plasma response to helical resonant magnetic perturbation coil current is numerically simulated for tokamak plasmas, with optimization results compared to those of conventional window-frame coils. We note that under the optimized design strategy, the ELM suppression is robust against variations in plasma equilibrium parameters, including (i) plasma resistivity, (ii) toroidal rotation, and (iii) plasma shaping (both elongation and triangularity).