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First Observation of ELM Suppression in ASDEX-Upgrade In A Similarity Experiment With DIII-D

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ELM suppression with 3D magnetic perturbations (MPs) is obtained for the first time in low collisionality ASDEX Upgrade (AUG) plasmas following shape-matching experiments on DIII-D. These experiments demonstrate the importance of low pedestal collisionality and strong shaping to access ELM suppression, and reveal a remarkable similarity in the alignment of the ExB rotation profiles to edge rational surfaces for the two machines, relevant to models of ELM suppression based on resonant field penetration. The experiments also demonstrate the weak role played by the impurity species and main ion dilution in affecting the onset conditions for ELM suppression, strongly supporting a common physics basis for ELM suppression at ITER relevant collisionality in metal and carbon wall experiments, based on resonant magnetic field effects at the top of the pedestal.

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