Linear plasma devices as tools to study plasma surface interactions and divertor physics

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Linear plasma devices (LPDs) have historically been a key tool to investigate plasma material interactions and remain vital to help extrapolate to future fusion devices like ITER and DEMO in a controlled and flexible manner. They give the ability to determine valuable data with a well-regulated parameter space and are essential to model and project the expected wall performance and evolution for these systems. Many topics have been explored and even first identified in LPDs, for example first demonstrating plasma detachment [1], identifying the process of Molecular Activated Recombination [2] or discovering the growth of so-called tungsten 'fuzz' [3]. More recently issues such as synergistic effects between plasma and thermal shock loading [4], the discovery of millimeter length large-scale fiberform nanostructures [5] and the examination of extremely high fluences on ITER monoblock mock-ups [6] show the continued relevance of LPDs to explore new issues and possibilities. As many new LPDs with advanced capabilities such as Magnum-PSI [7] have been developed in the last decade and continue to come online in the near future, such as JULE-PSI [8] and MPEX [9], investigating the synergistic influence of neutron loading with high fluence plasma, or the ability to investigate new novel approaches such as liquid metal based divertors, will also become possible. This talk will give an overview of the capabilities of linear plasma devices, their operation and historical and future development.

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