# Parameter dependence of small Edge Localized Modes

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The development of small Edge Localized Mode (ELM) scenarios is important to reduce the strain on plasma facing components. Such a scenario can be found at high density, close to double-null plasmas as small ELMs or type-II ELMs in ASDEX Upgrade, which are characterized by a frequency $f_{\mathrm{ELM}} > 300$ Hz and a low energy loss. Large type-I ELMs and small ELMs can occur simultaneously. While type-I ELMs can be described by a global peeling-ballooning model [1], the size and occurence of small ELMs is experimentally observed to depend for example on the density around the separatrix [2].

Experiments changing the edge density via different fuelling mechanisms and varying the plasma shape have been performed [3]. These experiments showed that small ELMs increase in size (divertor current amplitude) with the density at the separatrix, but they are reduced when the magnetic shear gets stronger. Both observations are in line with small ELMs being local ballooning modes driven by the pressure gradient and stabilized by magnetic shear. They cause transport and flatten the gradient region around the separatrix and thereby consequently narrow the effective pedestal width. Because a narrower pedestal is more stable against global PB modes, the stability boundary is shifted towards higher pressure gradients and type-I ELMs do not occur. As both, the local pressure gradient and the magnetic shear, strongly influence the amplitude of small ELMs, a series of additional discharges at high triangularity and at high separatrix density has been performed varying the toroidal magnetic field at constant plasma current to vary the magnetic shear. The influence of the flux surface averaged and the local magnetic shear on the amplitude and frequency of small ELMs will be shown.

## References

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