The prospects for a negative triangularity tokamak power plant

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[11] *See "Progress on an exhaust solution for a reactor using EUROfusion multi-machines capabilities" by E. Joffrin et al.*

Experimental observations show that negative triangularity plasma shaping can significantly improve the energy confinement time of tokamaks. Moreover, unlike the standard positive triangularity shape, negative triangularity plasmas typically cannot access H-mode. Together these two facts may enable an attractive power plant design. The plasma can be heated to reactor-relevant conditions while remaining in L-mode to avoid ELMs, yet still achieve sufficiently good confinement for high fusion gain. This potential has motivated the creation of one of EUROfusion's Theory, Simulation, Verification, and Validation (TSVV) projects, which is investigating the feasibility of a negative triangularity power plant using theory and simulation. This talk will synthesize the most important results from the TSVV together with recent experimental results from TCV. This will include the physical reasons behind the confinement time improvement, how performance scales to new parameter regimes (e.g. spherical tokamaks, high beta), insights from reduced transport modelling, the scrape-off layer width, and more. We will conclude by evaluating the prospects for a negative triangularity power plant.