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New physics basis for SOL width MIKE KOTSCHENREUTHER, PRASHANT VALANJU, SWADESH MAHAJAN, Institute for Fusion Studies — Existing empirical projection for SOL power width (projected from the divertor plate to the plasma midplane) have a very large uncertainty. Hence, the adequacy of required divertor operation on projected high power density devices (FDF, ST-CTF, Fusion Reactors, etc.) is highly uncertain. A simple general physical principle is presented which greatly reduces the uncertainty – transport in the near-SOL cannot substantially differ from the immediately adjacent pedestal. This is motivated by a diverse class of experimental data and theoretical estimates, and unifies apparently different projection approaches. We quantitatively formulate this and test against several lines of experimental data with good agreement. Our predictions for ITER are is reasonable agreement with the 2007 ITER physics basis, and generally support the narrower range of projections for next generation devices. SOL widths are necessarily narrow if there is a good H-mode pedestal, i.e., good core confinement and challenging divertor operation are intrinsically intertwined.

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