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On Heat Loading, Divertors, and Reactors MICHAEL KOTSCHENREUTHER, PRASHANT VALANJU, SWADESH MAHAJAN, JAMES WILEY, Institute for Fusion Studies, Univ. of Texas at Austin — We show that the relatively low thermal power handling capacity of the standard divertors (used in current as well as projected machines) forces extremely high ($\sim$95%) radiation fractions f_{Rad} in power reactors with characteristically large heating powers (much larger than ITER-FEAT). Independent of how one apportions this radiation (in the SOL or in the core), such high values of f_{Rad} have profound and deleterious consequences on the core confinement and stability to the extent that a high power hypothetical reactor operating with the standard divertor will not be able to meet the daunting confinement requirements. Even operation in the ITB mode could not lead to a dependable power reactor with acceptable economics. By designing a divertor with a considerably enhanced thermal capacity (through a flaring of the field lines) we have proposed a way out of the disabling core confinement and stability problems caused by high f_{Rad}. We suggest a possible class of experiments which could lay the foundation for an efficient and attractive path to practical fusion power.

Prashant Valanju
Institute for Fusion Studies, Univ. of T exas at Austin

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