Abstract Submitted
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Crossing the Next Frontier[1] R. GOLDSTON, J. MENARD, PPPL, J. BROOKS, ANL, R. DOERNER, UCSD, D. GATES, G.-Y. FU, N. GORELENKOV, R. KAITA, S. KAYE, G. KRAMER, H. KUGEL, R. MAJESKI, M. ONO, C. SKINNER, J. STRACHAN, PPPL, J. HARRIS, R. MAINGI, ORNL, M. KOTSCHENREUTHER, S. MAHAJAN, P. VALANJU, U Texas, R. NYGREN, M. ULRICKSON, SNL, D. RUZIC, U Ill, S. SABBAGH, Columbia, V. SOUKHANOVSKII, LLNL — The plasma-material interface is the next frontier in fusion science. ITER's approaches to heat flux and tritium retention do not extrapolate to Demo. Defining questions at this frontier include: Can extremely high radiated-power fraction be consistent with high confinement and low Z_{eff}? Can magnetic flux expansion or edge ergodization reduce heat loads sufficiently? Can tungsten survive with acceptable core radiation and tritium retention? Can liquid metals more effectively handle high heat flux, off-normal loads and tritium exhaust? Answers must be integrated with high-performance, fully steady state plasma operation, avoiding ELMs and eliminating disruptions. The vehicle to cross this frontier is a high-power-density plasma with long pulses, excellent diagnostic access, flexible first wall, divertor, heating, current drive and plasma control systems, extensive deuterium and trace tritium operation, and the ability to test a range of plasma-facing materials at reactor-relevant temperature.

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