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Integrated modeling of high poloidal beta scenario for a next-step reactor[1] J. MCCLENAGHAN, ORAU, A.M. GAROFALO, O. MENEGHINI, S.P. SMITH, GA — In order to fill the scientific and technological gaps between ITER and a nuclear fusion power plant DEMO, a next-step integrated nuclear test facility is critical. A high poloidal beta tokamak regime investigated in recent DIII-D experiments is a promising candidate for steady state operation in such a next-step device because the large bootstrap current fraction ($\sim$ 80%) reduces the demands on the external current drive. Despite the large values of $q_{95}\sim$10, the normalized fusion performance observed in the experiments meet the target for an economically attractive fusion power plant such as ARIES-ACT2. In this work, we will project the performance for a conducting and superconducting coil next-step steady state reactor using theory-based 0-D modeling and full 1.5D transport modeling.

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J. McClenaghan
ORAU

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