Abstract Submitted
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Physics design of a cryo-pumping system for NSTX-U[1] J.M. CANIK, R. MAINGI, ORNL, S.P. GERHARDT, M.A. JAWORSKI, J.E. MENARD, D.P. STOTLER, PPPL, E. MEIER, V.A. SOUKHANOVSKII, LLNL — The NSTX Upgrade is anticipated to require active particle pumping to achieve stationary conditions over increased pulse durations (up to ∼5 seconds), and to control the plasma density to access reduced collisionality regimes. While pumping by lithium wall coatings is also being explored, here we present an analysis of a complementary cryo-pumping system to provide particle control. A semi-analytic pumping model [Maingi, *NF* **39** (1999) 1187] has been extended, and used with NSTX heat flux and divertor temperature measurements to project the particle removal rates of candidate systems. The geometry and position of the pumping volume entrance have been optimized based on these projections to provide sufficient pumping over a wide range of plasma configurations. Assuming a balance between neutral beam fueling and cryo-pumping, results indicate that low plasma densities (down to ∼50% of the Greenwald density) can be obtained. The optimized pump is compatible with high flux expansion Snowflake divertors, which show stronger pumping than conventional geometries. Analysis of the optimized pump geometry using SOLPS [Schneider, *CPP* **46** (2006) 3], which uses a rigorous neutral transport model, will be presented.

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