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Upgrades to the NSTX SOL reflectometer to study plasma-antenna coupling and RF-edge interactions CORNWALL LAU, JOHN B. WILGEN, JOHN B. CAUGHMAN, GREG R. HANSON, Oak Ridge National Laboratory, JOEL HOSEA, RORY PERKINS, Princeton Plasma Physics Laboratory, PHIL RYAN, Oak Ridge National Laboratory, GARY TAYLOR, Princeton Plasma Physics Laboratory — The goal of the Oak Ridge National Laboratory (ORNL) scrape-off-layer (SOL) reflectometer is to measure the density profiles and fluctuations in front of the HHFW antenna on NSTX-U to help understand plasma-antenna coupling and RF-edge interactions, such as profile modifications due to field-aligned power losses and/or parametric decay instabilities. Originally designed for NSTX conditions, the reflectometer is being upgraded to operate at the increased magnetic fields of NSTX-U. General upgrades will be discussed. Most importantly, due to the doubling of the magnetic field for NSTX-U, the use of the current 6-27 GHz X-mode R cutoff on NSTX needs to be reconsidered. If only the X-mode R-cutoff is used, the operating frequencies will need to be modified, requiring significant hardware modifications to both the electronics and reflectometer launchers. It will be shown that the frequencies will not need to be modified for NSTX-U operation if both X-mode L and R cutoffs are measured. The measured SOL density profiles are intended to be used as inputs into RF simulation codes, and one such simulation using COMSOL multiphysics is being developed to understand the electric fields in front of the antenna for cold plasma conditions. Progress on the COMSOL simulation will be reported.

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