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**The STAR W Physics Program at RHIC** JOSEPH SEELE, MIT, STAR COLLABORATION — The STAR collaboration is preparing a tracking detector upgrade, the Forward GEM Tracker (FGT), which focuses on novel spin physics measurements in high-energy polarized proton-proton collisions, determining the flavor dependence ($\Delta\bar{u}$ versus $\Delta\bar{d}$) of the polarized sea. The production of $W^{-(+)}$ bosons provides an ideal tool to study the spin-flavor structure of the proton. $W^{-(+)}$ bosons are produced in $\bar{u}+d\,(\bar{d}+u)$ collisions and can be detected through their leptonic decays, $e^{-}+\bar{\nu}_e\,(e^{+}+\nu_e)$, where only the respective charged lepton is measured. The sensitivity of those measurements is enhanced in the forward direction. The discrimination of $\bar{u}+d(\bar{d}+u)$ quark combinations requires distinguishing between high $p_T$ $e^{-(+)}$ through their opposite charge sign, which in turn requires precise tracking information. An upgrade of the STAR forward tracking system (FGT) is needed to provide the required tracking precision for charge sign discrimination. The FGT will consist of six triple-GEM detectors with two dimensional readout arranged in disks along the beam axis. Preparations are underway for the first collisions of polarized protons at a center-of-mass energy of 500 GeV in Run 9. The expected data sample will allow to study for the first time the collision of polarized protons mediated by W bosons at mid-rapidity prior to the anticipated installation of the FGT in summer 2010. The status of the FGT project together with plans for the first 500 GeV run in 2009 will be presented.

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