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Studying proton spin structure with the PHENIX upgrade program

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The PHENIX upgrade program adds a set of silicon pixel detectors (the VTX and FVTX), forward calorimetry (the NCC), and Level-1 trigger detectors (the Muon Trigger Upgrade) to the baseline detector. These upgrades will enhance the ability of PHENIX to pursue a rich program of spin physics in polarized proton collisions, in particular at sqrt(s) = 500 GeV. The VTX and FVTX detectors will provide a larger x range over which the gluon polarization (Delat-G/G) can be determined and allow for a direct measurement of spin asymmetry in beauty production. The Nosecone Calorimeter will provide high-segmentation electromagnetic calorimetry at high rapidity to open a wide variety of channels through measurements of photons and electrons. It will also provide improved constraints on parton kinematics. The Muon Trigger Upgrade will allow the experiment to select high momentum muons from the decay of W bosons and reject both beam-associated and low-momentum collision background, enabling the study of quark and antiquark polarization in the proton trough the use of parity violating (single longitudinal spin) asymmetries. The combination of all three of these upgrades enable a complementary, comprehensive physics program. In many cases these upgrades will work together to improve the quality of physics measurements and reduce backgrounds. I will describe the various components of the upgrades, their implementation, and the expected sensitivity for a variety of spin-related measurements.

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