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Probing the Nucleus with Linearly Polarized Photons DANIEL BRANDENBURG, Brookhaven National Laboratory, STAR COLLABORATION — The intense electromagnetic fields produced by ultra-relativistic heavy nuclei have been proposed as a source of quasi-real photons i.e. in the Weizsacker-Williams equivalent photon method. A photon from one nucleus can fluctuate into a quark antiquark pair and interact directly with the other nucleus to produce a vector meson (e.g. ρ^0). It has been demonstrated that the interacting photons are linearly polarized, and therefore that the photon polarization should induce angular modulations in the final state particle distribution. In this talk we present STAR measurements of diffractive photo-production of the ρ^0-meson (and direct $\pi^+\pi^-$ pairs) in ultra-peripheral Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV. By employing a recently proposed technique, we measure the angular distribution of the final state $\pi^+\pi^-$ pairs and observe $\cos 2\Delta\phi$ and $\cos 4\Delta\phi$ modulations. Theoretical predictions suggest that such modulations may provide new insight into nuclear structure and may shed light on the transverse momentum dependent (TMD) distributions of gluons within large nuclei - a topic of great interest both at existing experiments and at a future Electron Ion Collider.

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