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Illuminating nuclei with Vector Mesons in the STAR Ultra Peripheral Collision Program RAMIRO DEBBE, Brookhaven National Laboratory, STAR COLLABORATION — The Ultra Peripheral Collision (UPC) program of the STAR Collaboration at RHIC has collected a substantial set of events where ρ and J/Ψ vector mesons are detected with no other hadronic activity between the colliding nuclei. The vector meson production in heavy ion ultra peripheral interactions is well described as quark-antiquark dipoles fluctuating out of the strong electric fields of the ions. These dipoles then strongly interact with the other nucleus via color-singlet exchange. We will present the distribution of the momentum transfer t of the detected vector meson in UPC Au+Au events at $\sqrt{s_{NN}} = 200$ GeV, around mid-rapidity. This distribution is connected to the partonic form factor of the nuclei as these interactions are seen as diffraction of beams of vector mesons on the hadronic component of nuclei. STAR's Zero Degree Calorimeters, designed to detect neutrons with beam momentum produced by weak excitations of the nuclei, can be used to separate events where the vector meson interacts coherently with the entire nucleus or incoherently with individual nucleons. The STAR UPC data sample is composed mainly of events with ρ mesons, but last year's extensive run produced a good sample of events with J/Ψ and we expect to be able to get a first glimpse of the "imaging" of nuclei with two wave lengths; the J/Ψ is considered a small object as opposed to the more extended nature of the ρ meson.

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