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Search for azimuthal anisotropies in γp interactions within ultra-peripheral pPb collisions in CMS

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In recent years there has been a great deal of effort to search for collectivity in small collision systems. Ultra-peripheral pPb events offer the possibility to study γ -proton collisions at a center of mass energy of several hundred GeV. Such collisions provide a new arena in which to search for collectivity. The CMS experiment has identified a large sample of γ -Pb collisions by selecting very asymmetric pPb events. These events are characterized by a large rapidity gap in the Pb-going side and no neutron emission from the Pb nucleus. These events are compared to a sample of minimum-bias pPb events with the same multiplicity. The observed azimuthal correlations at large relative pseudorapidity are used to extract the first, second, and third-order two-particle anisotropy harmonics, $V1\Delta$, $V2\Delta$, and $V3\Delta$, as a function of track multiplicity and transverse momentum. For both the γp and minimum-bias hadronic pPb samples, significant negative $V1\Delta$ and positive $V2\Delta$ values are observed, while the $V3\Delta$ values are consistent with zero. The single-particle second-order harmonic v_2 is larger for γp events than for minimum-bias hadronic pPb collisions at the same multiplicity. These results will be discussed within the context of other recent results to shed light on the emergence of collectivity in small systems.

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