

Abstract Submitted
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New Physics at Zero Degrees with Heavy Ions EDWIN NORBECK,
YASAR ONEL, University of Iowa — Photons and neutrons from spectator matter from Pb + Pb at 5.5 TeV per nucleon center of mass energy are concentrated mostly into a 10 cm diameter circle at 140 m from the interaction point. A spectator is that part of the Pb nucleus that is sheared from the rest of the nucleus by the oncoming Pb nucleus. The shearing breaks up tightly bound nucleon pairs with the result that energetic nucleons are emitted from the sheared face of the spectator. The resulting asymmetric neutron distribution shows not only the orientation of the reaction plane but also the direction of the overall angular momentum vector. This additional information opens a new window to heavy-ion reactions, including polarization effects and the angles between jet pairs. The spectators are exposed to an enormous electric field of the order 2×10^{28} V/m. In such a large electric field, quarks in the spectator radiate virtually all of the transferred energy. Studying these photons should produce new information about effects of extremely large electromagnetic fields. The necessary measurements could be made at CMS by upgrading the electromagnetic part of the Zero Degree Calorimeter to allow position resolution in both transverse and longitudinal directions. A suggested design is 5 W-metal plates interleaved between 6 layers of pixilated silicon detectors. The thickness of the W should be enough to cause 50% of the neutrons to initiate showers ($.693 \Lambda_{\text{int.}}$).

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