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What can we learn from remnants of spectator matter in central nucleus-nucleus collisions?

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Participating nucleons in collisions of relativistic nuclei are well separated kinematically from spectator nucleons, which propagate forward with the initial beam energy. In central ^{208}Pb–^{208}Pb collisions (0-5% centrality) the nuclear centres are typically separated by less than 3.5 fm [1]. This suggests that only few nucleons in far nuclear periphery escape collisions and move forward as spectators. Indeed, as found by measurements with fixed targets at the CERN SPS [2], 9 neutrons, 7 protons and 0.5 deuterons are produced on average in central ^{208}Pb–^{208}Pb collisions. The most central collisions can be unambiguously selected in experiments in colliders by requiring the highest multiplicity of secondary particles in the central barrel [3]. With our recently developed Abrasion-Ablation Monte Carlo for Colliders model (AAMCC) we calculate the yields of spectator neutrons and protons in central ^{197}Au–^{197}Au and ^{208}Pb–^{208}Pb collisions, respectively, at NICA and at the LHC. We demonstrate the sensitivity of the calculated yields to the presence of the neutron-skin [4] in initial nuclei and also evaluate the content of bound spectator nucleons in such collisions, which is extremely sensitive to the excitation energy of spectator matter. We argue that the measurements of central events with unequal numbers of spectator neutrons and protons (e.g., with a single proton accompanied by several neutrons and vice versa) can reveal these effects.
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References

1. C.Loizides et al., Phys. Rev. C 97 (2018) 054910.
2. H.Appelshäuser et al. Eur. Phys. J. A 2 (1998) 383.
3. B.Abelev et al., Phys. Rev. C 88 (2013) 044909.
4. M.B.Tsang et al., Phys. Rev. C 86 (2012) 015803.

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