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Event activity, direct photons and photon/hadron ratios in asymmetric collisions

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Collision centrality for large heavy ion systems is well defined both theoretically and experimentally, but the same is not necessarily true when very asymmetric systems, like p/d+A, collide. In light of some surprising result on the centrality dependence of high transverse momentum observables in p/d+A collisions at RHIC and LHC, the very concept of the geometrically inspired centrality gave way to “event activity”. Convincing experimental tests of the various phenomenological models are so far missing. After a critical review of the relevant results from SPS, RHIC and LHC we will discuss whether and how the measurement of the “centrality” dependence of high and low transverse momentum direct photons (pQCD and “thermal”) in p/d+A collisions, along with the photon/hadron ratios, can break the impasse. We will also explore whether there are any lessons to be learned with respect to the possible formation of QGP droplets in small systems, and extreme event classes in p+p and A+A collisions.

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