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## Jet and photon probes of small and large systems in ATLAS

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Jets and photons have been studied to constrain the initial and final stages of collisions between two large nuclei at the Large Hadron Collider.

Measurements of photon and jet production in  $p$ +Pb collisions are potentially sensitive to novel effects such as gluon saturation, the onset of non-linear QCD, and the energy loss of partons in the nuclear matter. In A+A collisions jets are modified as they pass through the hot nuclear matter. This talk presents recent ATLAS measurements of jets and photons in  $p$ +Pb, Pb+Pb and Xe+Xe collisions. Results on forward-forward and forward-central di-jet production in 5.02 TeV  $p$ +Pb and  $pp$  collisions in regions where the momentum fraction of a parton compared to a nucleon in the lead nucleus is small are presented. Also, measurements of photon production in 8.16 TeV  $p$ +Pb data over a large kinematic range is presented and compared to measurements in  $pp$  collisions and theoretical models. The comparison of di-jet balance in  $pp$ , Xe+Xe, and Pb+Pb collisions presented in this talk will provide information about the path-length dependence and role of fluctuations in the energy loss. Finally, measurements of the distributions of charged particles in and around jets as well as measurements of the energy and fragmentation functions of jets opposite photons are presented.

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