The ATLAS Heavy Ion Program

Within the next two years the LHC will commence a heavy ion program starting with Pb +Pb collisions at a nucleon-nucleon center of mass energy of 5.5 TeV. Such collisions are expected to produce quark gluon plasma at initial energy densities an order of magnitude larger than those achieved at RHIC with copious production of high-p_T jets, prompt photons, and other hard observables. The increased energy density of Pb+Pb collisions at the LHC will provide an essential test of the strongly coupled QGP (sQGP) interpretation of elliptic flow measurements at RHIC. The high rate for production of jets with (e.g.) $E_T > 50$ GeV will make it possible to carry out high-statistics measurements of jet quenching using direct measurement of jet energies, fragmentation functions, and jet shapes. The large LHC collision energy will also allow tests of saturation at x values as low as 10^{-7} in A+A and p+A collisions.

The ATLAS detector at the LHC was designed primarily for Higgs and/or beyond the standard model measurements in p-p collisions. However, the large acceptance of the ATLAS detector, the high granularity electromagnetic and hadronic calorimetry, and precision silicon tracking and the large acceptance muon spectrometers also make ATLAS an excellent Pb+Pb detector. ATLAS is well-suited to make day-1 measurements of bulk observables such as charged particle $dN/d\eta$, $dE_T/d\eta$, and photon and charged particle v_2. ATLAS will carry out high-resolution single jet and multi-jet measurements over $|\eta|<5$ and will measure jet charge particle fragmentation functions and J_T distributions over $|\eta|<2.5$. Heavy flavor jets will be tagged using semi-leptonic decay muons and displaced vertices. using the fine segmentation of the ATLAS electromagnetic calorimeters to efficiently rejection photons from neutral hadron decay ATLAS will be able to statistically measure direct and jet fragmentation photon production in Pb + Pb and cleanly measure γ-jet pairs. Together, the inclusive jet, heavy flavor jet, and γ-jet measurements along with large-acceptance measurements of medium response will comprise a comprehensive and sensitive probe of parton interactions in the medium. Hopefully, the understanding of jet quenching that should follow from such measurements will allow the realization of jet tomography of the quark gluon plasma. Using the muon spectrometers, ATLAS will measure Upsilon production with the ability to separate the Y, Y', and Y'' states and will measure J/Ψ production at moderate and high p_T.

Current studies of the performance of the ATLAS detector carrying out the above-described measurements will be presented and the status of and prospects for the ATLAS heavy ion program will be described.