ATLAS Heavy Ion

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Goals

A. Preparation of a **Physics Performance Report** (PPR) by October 2006. The document should describe the goals of the working group during as far as physics goals, readiness to acquire data, and analyze data.

B. Prepare for Data Collection and Trigger strategies for heavy ion runs, scheduled for 2008.

C. Prepare for Data Analysis. Define necessary software packages and algorithms to handle heavy ion data within the ATHENA framework.

Physics Goals

The goals of this working group should focus on the study of media properties produced in heavy ion collisions.

A. Media induced modifications of basic QCD processes, for example "jet quenching".
B. Media properties study via Upsilon and J/Psi
C. Media global properties, i.e. collective properties.
D. Gluon saturation physics, via proton nucleus collisions.
E. Ultra peripheral physics as a tool to study gamma+nucleus interactions
F. (W. Krasny electroweak symmetry breaking studies)

1. Day One Physics

Day One Physics addresses the measurement of Particle Multiplicity, Transverse Energy Distributions, dN/deta, dET/deta, R_{AA}

Requirements: Minimum bias trigger, better understanding of LUCID, FCAL and MBTS in the heavy ion runs.

Barbara Wosiek, Peter Steinberg, Mark Baker, Rachid Noucier

2. Global Properties

Elliptic flow studies with the ATLAS detector. To determine global properties, i.e. hydrodynamics of QGP

Requirements: Minimum bias trigger, trigger detectors, modifying magnetic field in the solenoid, zero magnetic field, Pixel and SCT, FCAL, LUCID.

Barbara Wosiek, Andrzej Olszewski, Adam Trzupek, Krzysztof Wozniak, Barbara Toczek

3. Jet Physics

2 and 3 jet reconstruction, compare different techniques e.g. sliding window, shape fitting, kT clustering, removal layers in calorimeters...
b-jets - dislocated vertex tagging, muon tagging
Z0 measurement, inclusive and Z0+jet
Prompt photon, inclusive and gamma+jet, gamma*(di-muon)+jet

Requirements - calorimeter clustering, Jet energy calibration, Jet trigger in heavy ions, isolated cluster, Z0 - e+e-,

Jiri Dolesji, Martin Spousta, Brian Cole, Misha Lelthouck, Valeri Pozdnyakov, A. Moraes. H. Takai, Mark Baker, Rachid Noucier, Flemming Videbaek

4. Heavy Quarkonia

via mu+mu- and e+e-

Simulation with distributions from Ramona Vogt
c,b production in mu+mu- and e+e-, others.
Improve forward tracking
Use of the TRT, identify electrons
Reduce the toroidal field?
High Level Trigger (reconstruction of muons and electrons).

L. Rosselet, Marzia Rosati, Alexander Lebedev, John Hill

5. ZDC and Ultra Peripheral collisions

Construction Project of ZDC
Ultra Peripheral collisions in pp, AA and pA.

What is required? Trigger studies. Installation of ZDC. Readout electronics,

Sebastian White , Valeri Pozdnyakov, Sergei Timoshenko, Bryan Caron, Jim Pinfold

6. Proton Nucleus collisions

Simulation on proton nucleus collisions

Brian Cole, Fernando Marroquim

7. Trigger

What will be required to run heavy ion physics?

Michael LeVine

8. ATHENA and Event Generator

ATHENA framework, fast simulation, Minimum bias events for trigger and background studies, Which (other) Monte-Carlo: HIJING,SPM,DPMJET,...

Heavy Ion Data Challenge as part of DC3. To study background, rare processes, etc.

Andrzej Olszewski Pavel Nevski, Misha Lelthouck, Sergei Timoshenko

9. Tracking

Implementing tracking software in heavy ion events. Reduce the number of fake tracks.

Pavel Nevski, Mark Baker, Ramiro Debbe

10. Light Ion Collision

LHC will run lighter ions in the future.

11. Proton-proton (low luminosity)

Participate in ATLAS standard model working group. underlying event, etc...

Arthur Moraes, J.H. Lee, Helio Takai