PHENIX Input to the RHIC Retreat

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PHENIX Run 2 Summary

Au–Au run:

Integrated machine luminosity **for all Z** was 85 μb^{-1}

Integrated luminosity inside **–45 cm < Z < 45** cm was about 42 μb^{-1}

Integrated luminosity **recorded by PHENIX** was about 24 μb^{-1}

170 million total events processed (92 million minbias):

- 76 million in first 10.5 weeks
- 94 million in last 2 weeks

High pT hadrons to **beyond 10 GeV/c**

p–p run:

3.7 billion total events processed (188 million minbias)

Integrated (DAQ live) luminosity was **0.15 pb^{-1}**

0.13 pb^{-1} of that was recorded in the last 2 weeks

Integrated **$(P_B^2+P_Y^2)$ x Luminosity** was about **0.0065 pb^{-1}**

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Comments on Au–Au Run

PHENIX **saw** up to about **1600 Hz** trigger rates
As many as 20% of those were trash from beam halo
We were able to **process** up to **800 Hz** event rates
Because the high rates were short lived, we lost very little physics
We did **not** have to prescale any of the core physics triggers

The integrated luminosity was **1/12** of what we hoped for (300 μb^{-1})

So we have a **decent data set** for:

- Global physics
- High pT hadron physics
- Photon physics
- Single electron and single muon physics

But the data set is **statistically quite marginal** for

- Heavy vector mesons (J/Ψ etc.) –> electrons and muons
- Light vector mesons –> electrons and muons

Important Lessons Learned in Au–Au Run

Our **goals** were unrealistic (by x 10) relative to accelerator performance

- Luminosity was high for only 2 weeks, not 10
- Vertex distribution was too wide (x 2)

Production running started **long before** luminosity was high enough

- We will argue very strongly against this in run 3

Our muon arms are **extremely** sensitive to beam halo

- in run 3 we need both shielding **and** beam scraping

We need to improve negotiation with CAD **and** the other experiments

Comments on p–p Run

PHENIX **saw** up to about **22 KHz** trigger rates
We were able to **process** all of those triggers at level 1
We did **not** have to prescale any of the core physics triggers

The integrated luminosity was **1/25** of what we hoped for (3.8 pb^{-1})
The integrated **P^2 x luminosity** was about **1/150** of what we hoped for

So we have a **decent data set** for:

- Global physics
- High pT hadron physics
- Photon physics
- Single electron and single muon physics

But the data set is **statistically quite marginal** for

- Heavy vector mesons (J/Ψ etc.) –> electrons and muons
- Light vector mesons –> electrons and muons
- Spin physics – **we did not achieve any of the original goals**

Important Lessons Learned in p–p Run

Again, our **goals** were unrealistic relative to accelerator performance

But in my opinion, the p–p run was a much better **model** for future RHIC running than the Au–Au run, despite disappointing luminosity and (especially) polarization:

- Beam development took 5–6 weeks, and achieved roughly the luminosity predicted from Au–Au performance

- The experiments were mostly in agreement about priorities, at least near the end of the run

- The experiments and CAD were willing to compromise about beam studies, and make production the priority in the last 2 weeks

Angelika's study showed that **beam scraping** can reduce background rates in our muon arm by x 5, with no loss of beam intensity

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Recommendations for Run 3

Establish **minimum criteria** for production running and continue beam development until either:

- The criteria for production running are met
- CAD declares that they cannot reasonably be met, and we agree to revise them

Run Coordinators meet weekly (Monday?) with **Scheduling Physicist** to agree on the schedule for the week

Scheduling Physicist presents Monday meeting agreements on Wednesday, any remaining disputes are resolved

Scheduling Physicist tries to see this is the schedule that is followed

Experiments make **progress reports** Wednesday

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