

# CLASH bing follow-up

group 1 - Initial stage & stages of the evolution

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## Overview

- $\cdot\,$  Proton geometry and flow
- Multiplicity distributions
- HBT interferometry
- Balance functions



Peter getting ready to ask the important questions!

#### **CLASH** questions!

To which subjects can we directly contribute?What can *I* do to contribute?

### Proton geometry and flow

- Final state interactions:  $v_2 \propto \epsilon_2$ , broken in pp?
- Realistic proton geometries? Sign of CGC effects?
- · Excellent for Mueller cascade parameters fixed!



#### **CLASH** questions!

- $\diamond$  Can  $\epsilon_2$ {4} < 0 with realistic geometry?
- ◊ Is shoving and/or QCD-CR response linear?
- Are there more exclusive experimental signatures?

## Multiplicity distributions and fluctuations



#### **CLASH** questions!

 $\diamond$  Measure/calculate fluctuations in small centrality bins.  $\diamond Q_s/p_{\perp,0}$ -fluctuations and large multiplicity?  $\diamond$  Full characterization of high multiplicity pp events?

## **HBT** interferometry

### Key signatures in HBT:

- $M_T$ -scaling (1):  $R \sim c_0 / \sqrt{M_T}$
- $M_T$ -scaling (2):  $c_0^{\text{pion}} \neq c_0^{\text{kaon}}$
- $dN^{\rm ch}/d\eta$ -scaling



R<sup>G</sup><sub>out</sub> (fm)

PHENIX AuAu @ 200 AGeV

STAR AuAu @ 200 AGeV

1, 5, 8, 7, 45, ente 12, 2°ere 7 er

a)

### **CLASH** questions!

- $\diamond$  Can Pythia/Angantyr reproduce  $M_T$ -scaling? CGC?
- $\diamond$  What about  $dN^{\rm ch}/d\eta$ -scaling?

## **Balance functions**

BF idea:

- Charges are produced in pairs at same point and diffuse away throughout subsequent evolution
- Measured in both  $\Delta y$  and  $\Delta \phi$
- Mostly measured in AA

Key signatures in BFs:

- · More flow  $\Rightarrow$  narrower BFs
- Delayed hadronization (e.g., QGP formation) ⇒ narrower BFs
- Less diffusion  $\Rightarrow$  narrower BFs

#### **CLASH** questions!

Does Pythia/Angantyr see BF narrowing with centrality?
What do BFs look like in small systems (pA and pp)?



From PRL **90**, 172301 (2003)

### Summary

And now...

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#### **CLASH** questions!

◊ Group 1 has formulated several concrete "next steps"

- ♦ Where can you contribute?
- Special thanks to Peter for heading up a very successful bing!