

Wishes and Goals

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1. Wishes

2. Goals

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 - 1.1 Nobel prize 2030
2. Goals

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2. Goals
 - 2.1 Everything else

Some unifying themes

1. **Discrimination:**
2. **Exploration:**
3. **Fluctuation(s):**

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1. **Discrimination:** how can we distinguish between string-breaking vs. other models?
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2. **Exploration:** how do observables change across different collision systems (A+A, p+A, and p+p) at (say) fixed N_{ch} ? Different $\sqrt{s_{NN}}$? What can we say about fundamental aspects of QCD?
3. **Fluctuation(s):**

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2. **Exploration:** how do observables change across different collision systems (A+A, p+A, and p+p) at (say) fixed N_{ch} ? Different $\sqrt{s_{NN}}$? What can we say about fundamental aspects of QCD?
3. **Fluctuation(s):** how well can we describe distributions of observables?

Previous work

1. Hanbury Brown-Twiss (HBT) interferometry
2. Fluctuations and correlations
3. QCD thermodynamics and equation of state (EoS)

Interesting topics and ideas

1. Strangeness

- 1.1 **ϕ -meson production:** potential discriminator between string-breaking models and statistical thermal models in small systems
- 1.2 **ϕ -meson HBT in pp vs. AA:** I don't think this has been done before...
- 1.3 **KK HBT vs. $\pi\pi$ HBT [1]:** information about nature of collectivity from violation of M_{\perp} scaling

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[ESE \equiv Event-Shape Engineering]

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4. Search for the QCD critical point

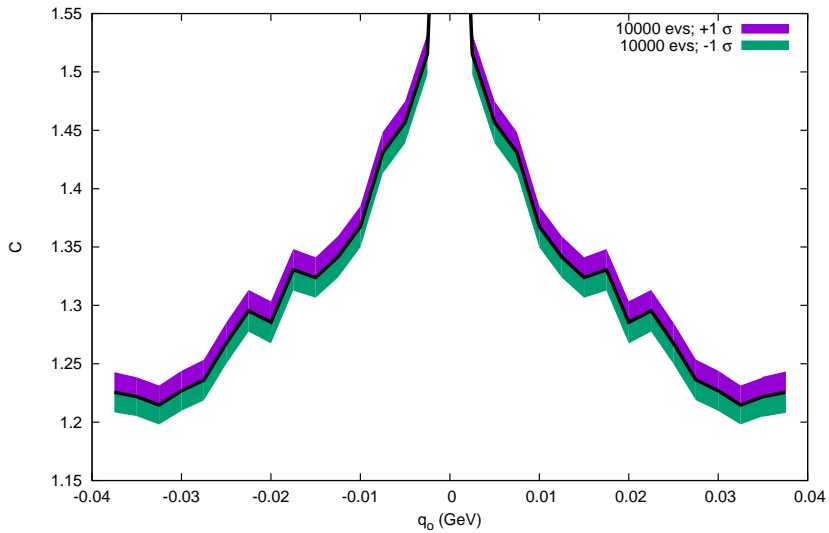
Some more definite goals

1. Interferometric miscellany

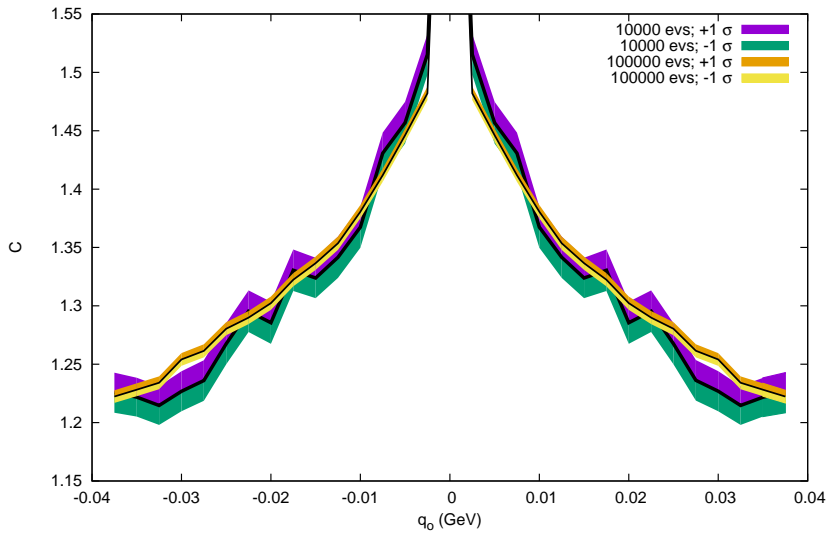
1.1 Pythia/Angantyr + HBT w/ π^+ 's

1.2 Ditto K^\pm 's, ϕ 's, etc.

Pythia: pp @ 13 TeV: $0 \leq K_T \leq 200$ MeV



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1.3 Implement into Rivet









2. Fluctuations and correlations

2.1 Flow fluctuations and factorization breaking [5, 6, 7, 8]

2.2 HBT fluctuations \leftrightarrow event-by-event HBT

2.3 Flow-HBT correlations, e.g.,

$$\frac{\langle \langle p_T \rangle_{\text{s.e.}} (R_{ij}^2)_{\text{s.e.}} \rangle_{\text{ev}}}{\langle \langle p_T \rangle_{\text{s.e.}} \rangle_{\text{ev}} \langle \langle (R_{ij}^2)_{\text{s.e.}} \rangle_{\text{ev}} \rangle_{\text{ev}}} - 1$$

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