

BES II Strategy Considerations

Wolfram, from the Collider Accelerator Division (CAD) has posed us the following questions:

- 1) What at the minimum and maximum event goals at each energy?*
- 2) Can Run-20/21 be used for contingency if physics goals have not yet been met?*
- 3) Can 3rd energy be lowered if DC gun voltage and/or booster cavity voltage for LEReC+ cannot be reached? By how much?*
- 4) Can we start at highest energies w/o cooling and interleave with cooling commissioning?*
- 5) Can we run the lowest energies last (largest running time)?*
- 6) Can we rapidly switch between physics and cooling commissioning, e.g. 2 shifts cooling commissioning followed by 2 days of physics?*

We meet with Wolfram on Tuesday to discuss these issues, and what ever other issues might effect the strategy of BES II.

1) What at the minimum and maximum event goals at each energy?

→ Read that the development of eCooling is not progressing as well as hoped

This means that we may need to settle for less ambitious goals and that we will need to switch away from a given energy as soon as the Maximum target are met.

Collision Energies (GeV):	7.7	9.1	11.5	14.5	19.6	
Chemical Potential (MeV):	420	370	315	260	205	
Observables	Millions of Events Needed					
R_{CP} up to p_T 4.5 GeV	NA	NA	160	92	22	
Elliptic Flow of ϕ meson (v_2)	100	150	200	300	400	
Local Parity Violation (CME)	50	50	50	50	50	
Directed Flow studies (v_1)	50	75	100	150	200	Min
asHBT (proton-proton)	35	40	50	65	80	
net-proton kurtosis ($\kappa\sigma^2$)	80	100	150	200	300	Med
Dileptons	100	160	230	300	400	
Proposed Number of Events:	100	160	230	300	400	Max

2) Can Run-20/21 be used for contingency if physics goals have not yet been met?

→ Another flag that the schedule may be slipping

The eTOF may not be available for 2021.

Flemming has proposed that we identify which physics goals need eTOF.

- Directed Flow (γ -dependence)
- di-leptons
- v_2 of the phi meson
- Fixed-Target program for energies 4.5 to 7.7 (easy to complete in first year)

3) Can 3rd energy be lowered if DC gun voltage and/or booster cavity voltage for LEReC+ cannot be reached? By how much?

→ Seems that the Booster may be unlikely

This is our current proposal for energies:

7.7	9.1	11.5	14.5	19.6
420	370	315	260	205

If I add a third digit of precision (but maybe not accuracy):

7.7	9.1	11.5	14.5	19.6
422	375	316	264	206

34 37 73 72 Difference in μ_B

We could consider:

7.7	8.8	10.0	13.6	19.6
422	388	351	278	206

34 37 73 72 Difference in μ_B

Lowering energies
Increases required
beamtimes

4) *Can we start at highest energies w/o cooling and interleave with cooling commissioning?*

→ Another warning flag... maybe not booster, maybe LEEC not ready for 2019

This should not be that much of an issue →

- Negative: Shift crews might get bored during commissioning
- Positive: More time to analyze data to provide feedback to operators

5) *Can we run the lowest energies last (largest running time)?*

→ Warning... LEEC maybe not be ready in 2019

The should not be an issue. The order of beams in not critical for our program...
However, if this means running 7.7 in 2021, then we need to consider whether the eTOF is critical for 7.7 GeV.

6) Can we rapidly switch between physics and cooling commissioning, e.g. 2 shifts cooling commissioning followed by 2 days of physics?

See point 4... for us this is not so difficult. The detector does not care. The shift crews might get bored.