FFA@CEBAF Working Group|Minutes

## Meeting date | time 04/12/2024 | 11 AM EST | Meeting location <https://jlab-org.zoomgov.com/j/1614898082?pwd=TnUzMS81M2sxbDZIbERJU01tYkJCQT09>

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| |  |  | | --- | --- | | Meeting called by | Alex B | | Type of meeting | Weekly Meeting | | Facilitator | Alex B | | Note taker | Ryan | | Timekeeper | Alex B | | Attendees  Alex B, Ryan, Alex C, Donish, Edith, Nick, Scott, Kirsten, Roger, Dejan, Vasiliy, Tim, François, Thomas |

# Intro Discussion

* Let’s add our work to the IPAC24 folder for the collab
  + Due date May 15 – but must go through internal review. So put them in the internal reviews early enough for review before final date.
  + Make sure co-authors are all fully aware of what they’re on

# Agenda topics

## Time allotted | 25 mins | Agenda topic Transition| Presenter Randika/Vasiliy

* Randika can’t be here today – will have to update at a later time.
  + All in Randi’s hands – he’s the one doing the work and should be present. Let’s wait a few weeks.

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| Action Items | Person responsible | Deadline |
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## Time allotted | 25 mins | Agenda topic LDRD | Presenter Donish

* Exciting option to explore – do we expand energy with sextupoles or not?
  + Alex B and Andrei in “upgrade study group” and decided this should be studied
* Donish is “PI” for proposal – working on concept paper
* A picture containing timeline

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  + Not a lot of energy flexibility – 1% change in energy falls out of range of FFA arcs
  + Can decrease energy to 5 passes, making it 19.4 GeV and increases energy flexibility
  + Roger – if energy of LINAC is upgraded, can you use the same FFA arc?
    - Potentially, yes
  + Alex C – the studies we currently have show that if we increase the LINAC now with current baseline, not good -aperture not good
    - Drop last pass, ton of headroom, lots of space at the bottom
* A picture containing chart

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  + What happens if add higher-order components?
  + Prelim studies say it’ll increase energy range, decreases area of magnets
* Graphical user interface, text, application, email

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* Alex B – could you show the concept paper a bit as well?
* Text, letter

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  + Frame as energy flexibility study instead of just adding sextupoles
* Ryan – two things:
  + 1 you have to be staff to be a PI
    - Alex B – Donish is in transition to Staff 1 now.
  + 2 you have to keep as much of this in house as possible – external people have to do the work here
    - Roger says this is definitely important – may not get funded if money goes out of the lab
* Dejan – spoke to Andrew Hutton about deleting splitters overall
* We can focus the title on energy flexibility instead of sextupoles
* Text

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  + JLab will still send 0.5 FTE to BNL nonetheless (Alex B)
* Ryan – if we get both the FOA and the LDRD, have to make sure the funding doesn’t overlap FTEs
* Scott – raining on Donish’s parade
  + Energy flexibility point is a good one.
  + Issue is that we start with sextupole in arc, but then when you start looking at subsequent steps, they involve things that we essentially don’t have down yet
    - Need a set of beamlines from LINAC to FFA and back again
      * Energy flexibility important at this design as well (Splitters and Transition)
      * Even looking at transitions – these rely on nailing specific energies
    - Need a “full solution” first at entire energy range
  + Would think in terms of refocusing this: goal is to really work out in detail that transport between LINAC > FFA > Back to LINAC is achievable
  + The really hard work that needs to be done are the connection points
    - Could venture into splitters and transitions
* Dejan – if we have splitters, it’s always allowed to adjust the currents in the elements/splitters
  + Scott – yes, but have multiple beams going through elements. Need to make sure you can have enough steering control to control common beams.
  + RYAN HAD TO DO A FEW MOMENTS OF OPTICS ON CALL AND MISSED A MINUTE
  + Scott – need one trackable solution
* Ryan – make sure you have two years of work, with milestones, etc…
* Dejan – work in progress:
  + Chart, line chart

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  + Chart, line chart

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    - Dispersion varies between -2 cm to +4 cm
    - Isochronous – mom. comp. = 0
  + Betas similar to now
  + Flip signs in middle
  + Values of gradients: 160 T/m, 88 T/m
    - Possible to do with Stephen’s magnets
    - Will add multipoles (sextupoles)
    - Curly H very small
* This is alternative to FODO style we have in FFA now
* This is about 10 m long
* Central energy same as before to reduce SR – 21.97 GeV – close to end of range
* Length of mag = 1.25 m
* Alex B – nice variation on FODO – still has alternating feature
  + Dispersion/momentum compaction smaller – great deal
  + Smaller emittance dispersion / curly H
* Donish can take these and start playing
* Scott – gradients?
  + -87.9 and 78.4 in FODO
  + 161 and 88 where you switch phase
* Scott – 4 defocusing and 4 focusing – so two kinds of focusing, 3 kinds of defocusing
* Variables – central two focusing are 160 T/m – middle defocusing are 88
* Scott – you have 5 DoF in here
  + If this is the central energy, if you plot ToF as function of E, you’d be at a minimum here
  + To flatten that out, put in sextupoles – they’ll need to be strong b/c of low dispersion function
  + Sextupoles will need to do three things:
  + 1 flatten out ToF, 2 keep control of chromaticity,
  + Dejan – also need to control amplitude tune shift (will need more families)
* 19 cm between F and D, 15 cm between FODO and Strong Mags in middle
  + Not enough for ports/vacuum – will need to accommodate
    - Maybe split the defocusing in middle to give pump station, etc…
* This might eliminate splitters?
  + Pimplets (?)
  + ISIS upgrade
* Tomas – what’s your impression of Dejan’s idea
  + Came late
  + Don’t understand enough yet to have an opinion – will try to join more often
* Ryan – sent Donish the old concept paper as a template
* Dejan – if this idea works, it opens up enormous space and changes ERLs
  + Can go down to energy of ERL
  + Opens up new field in Accelerator Physics
* Alex C – gives top/bottom ends on energy ranges
  + 22.8 - 22.6 max end
  + 11.6 - 10.6 low end

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## Special notes

Pathway to Repository: <https://jeffersonlab-my.sharepoint.com/:f:/g/personal/tristan_jlab_org/EqZ5MeS-nipCgPfZB5p0oS4B9Is67d3nQb9sLJI3Zyev9g>