Comparison of design difficulties and performance

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Design similarities

- Final focus design
- Optics design of downstream diagnostics & performance
- Optics design and simulations tools (beam losses)
- Transverse separation for beam dump, transverse beam sizes on the beam dump window (optics/sweeping kickers)
- Backgrounds, synchrotron radiation and back scattering
- Location and apertures of feedback kickers
- Collimation depths (different constraints)
- Integration into the detector

Differences in the designs

2 mrad

- Final focus can be optimised for the extraction line and then fitted for the incoming line
- Large bore SC FD magnets
- Beamstrahlung –opening cone
- Beamstrahlung passes at 2 mrad
- Design of warm shared magnets
- Synchrotron radiation in QD0
- Estimation of losses and definition of apertures
- Separation between crab cavities at ~400 m
- Integration of FD with large bores inside the detector

Differences in the designs

Head-on

- Final focus can be optimised for the extraction line and then fitted for the incoming line – not much flexible due to constraint on the parasitic bunch crossing
- Parasitic bunch crossing – different parameter sets (bunch separation)
- Electrostatic separator
- Beamstrahlung –opening cone, dump ~300m, only few incoming magnets shared.
- Design of warm shared magnets
- Synchrotron radiation and back scattering
- Losses more due to strong final doublet and no quadrupoles upto ~200m

Downstream diagnostics evaluation

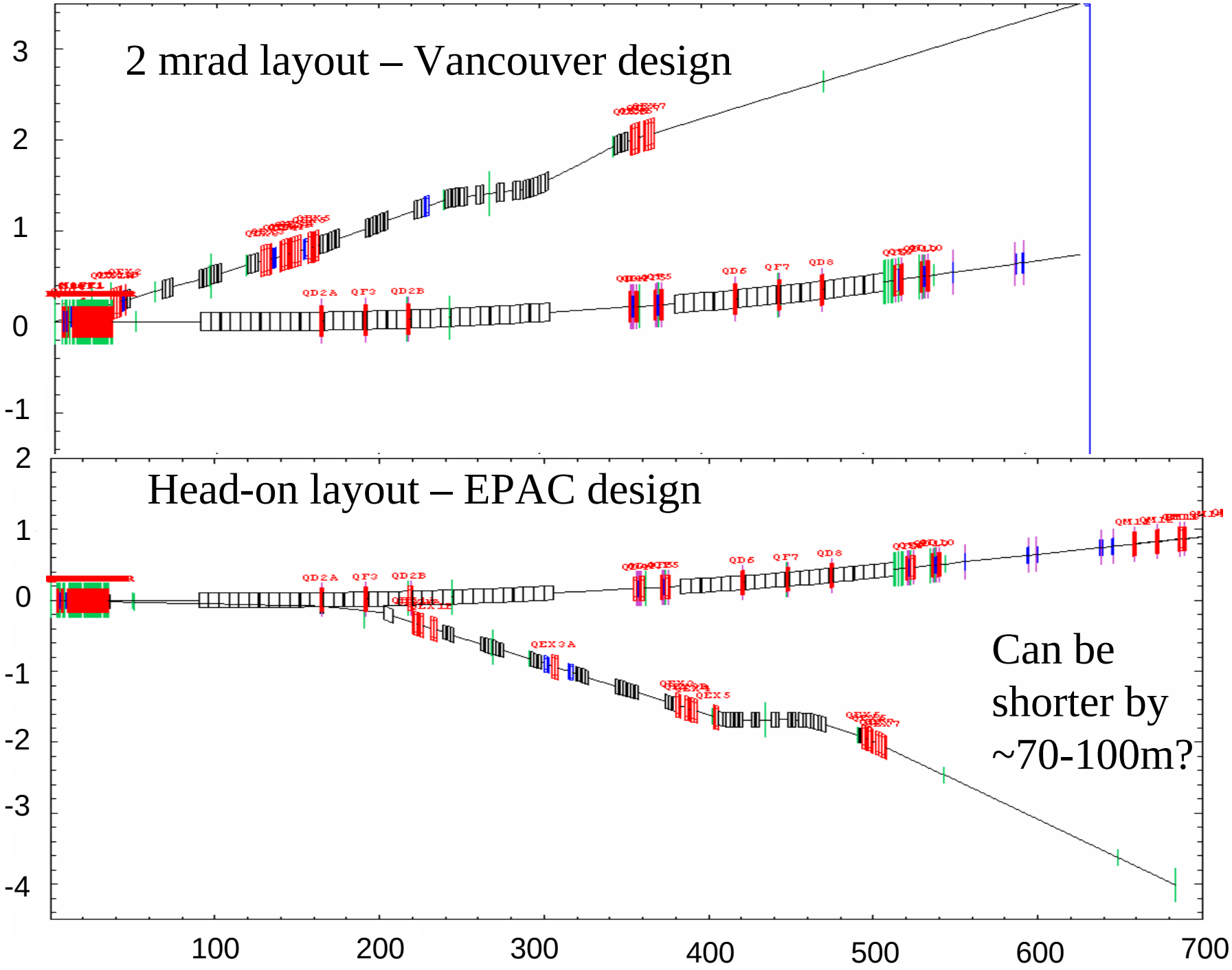
Comparisons for 250GeV/beam	**20mr**	**2mr**
Beam overlap with 100mm laser spot at Compton IP	48%	15%
Polarization projection at Compton IP	99.85%	99.85%
Beam loss form IP to Compton IP	<1E-7	>2.6E-4
Beam SR energy loss from IP to middle of energy chicane	119MeV	854MeV
Variation of SR energy loss due to 200nm X offset at IP	< 5MeV (< 20 ppm)	25.7MeV (~100 ppm)
The need for SR collimator at the Cherenkov detector	yes	No

Head-on

?

Seryi, Moffeit, Maruyama etc

comparable with the goal for E precision measurements


2 mrad layout – Vancouver design
Head-on layout – EPAC design
Can be shorter by ~70-100m?
QD2A
QF3
QD2B
QD6
QF7
QD8
QEX3A
QEX5
3
2
1
0
-1
2
1
0
-1
-2
-3
-4
100
200
300
400
500
600
700

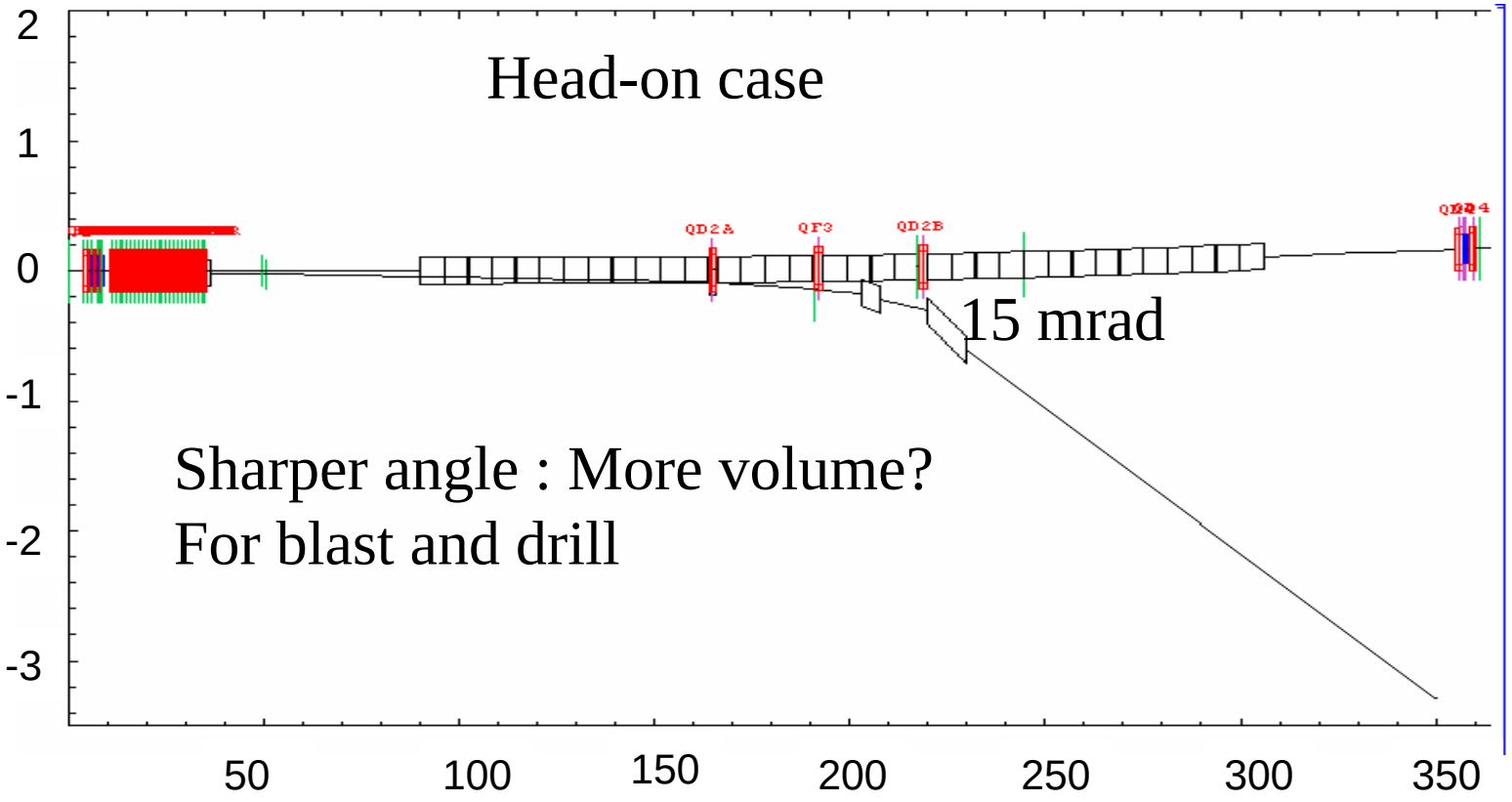
Questions

- Do we have resources to work on the both the alternatives?
- Do we want to choose one scheme only?
  - When? How?
- We need support from both SC and warm magnet experts.
  - Can we identify (specially warm magnets)
- Performance evaluation – important
- Funding situation and priorities for alternatives?

Minimal Extraction Scheme

- Due to the cost differences, would like to compare ‘Minimal’ design for both 2 mrad and head-on?
- Arguments for downstream measurements – yesterday’s Philip’s talk.
- With possibility of 1 IR, the requirement is probably most needed?

Minimum design without diagnostics to provide required separation of 3.5m for the beam dumps.
What is the minimum distance from the IP where beam dump can be located?
Lew's suggestion of making hole for the incoming beam through the beam dump?



Length of the line still ~ 350m with this large bend

Minimum length for 2 mrad case