For discussion of minimal machine

For BDS design team

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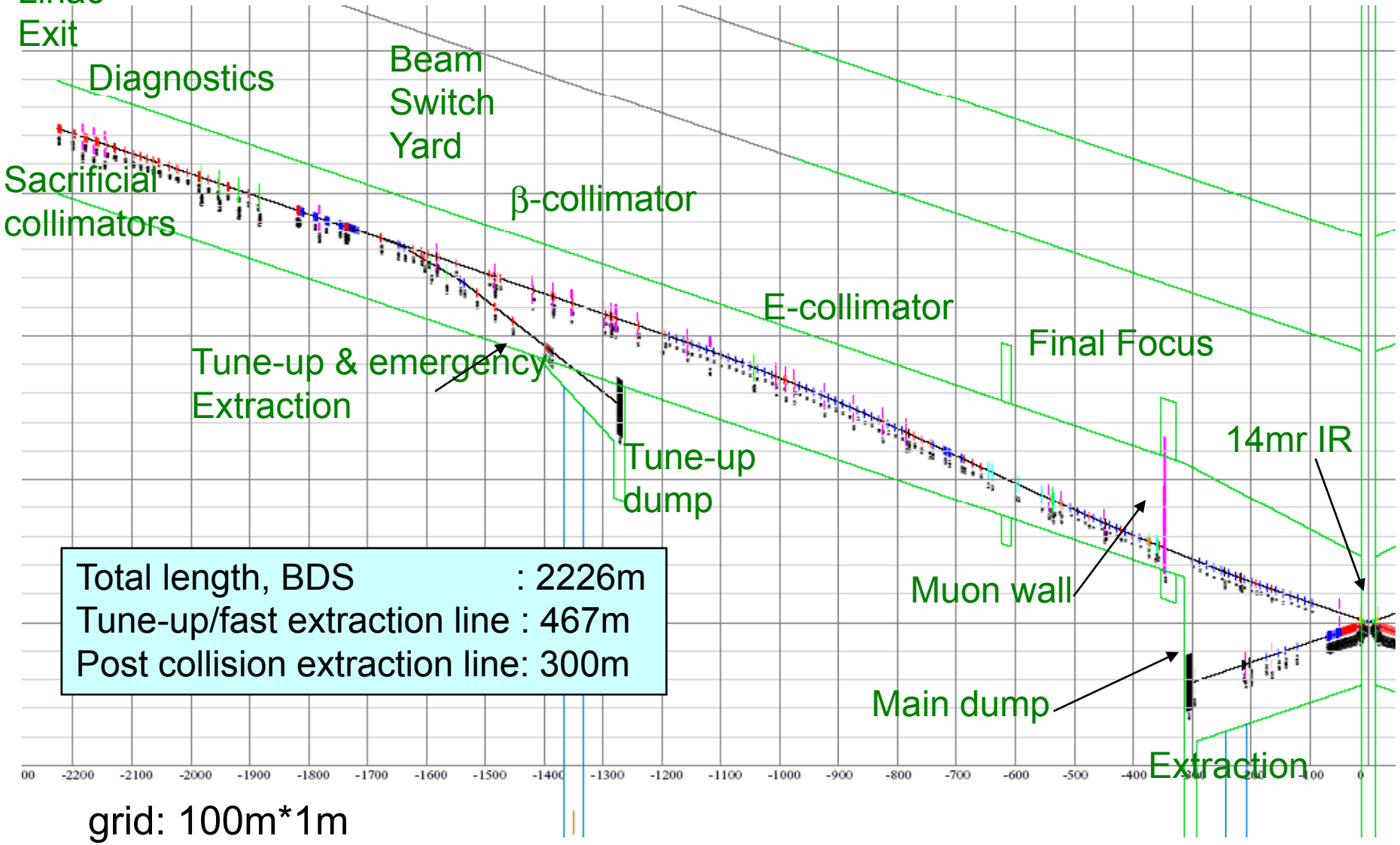
RDR BDS Design



Total length, BDS : 2226m
Tune-up/fast extraction line : 467m
Post collision extraction line: 300m

grid: 100m*1m

Beam Delivery Systems strategy in TDP

In TDP I & II plan, the scope of work changed, and the focus is shifted

→

- Focus on a few critical directions. Selection criteria:
  - –Critical impact on performance versus cost;
  - –Advanced ideas promising breakthrough in performance;
  - –Broad impact and synergy with other worldwide projects

→

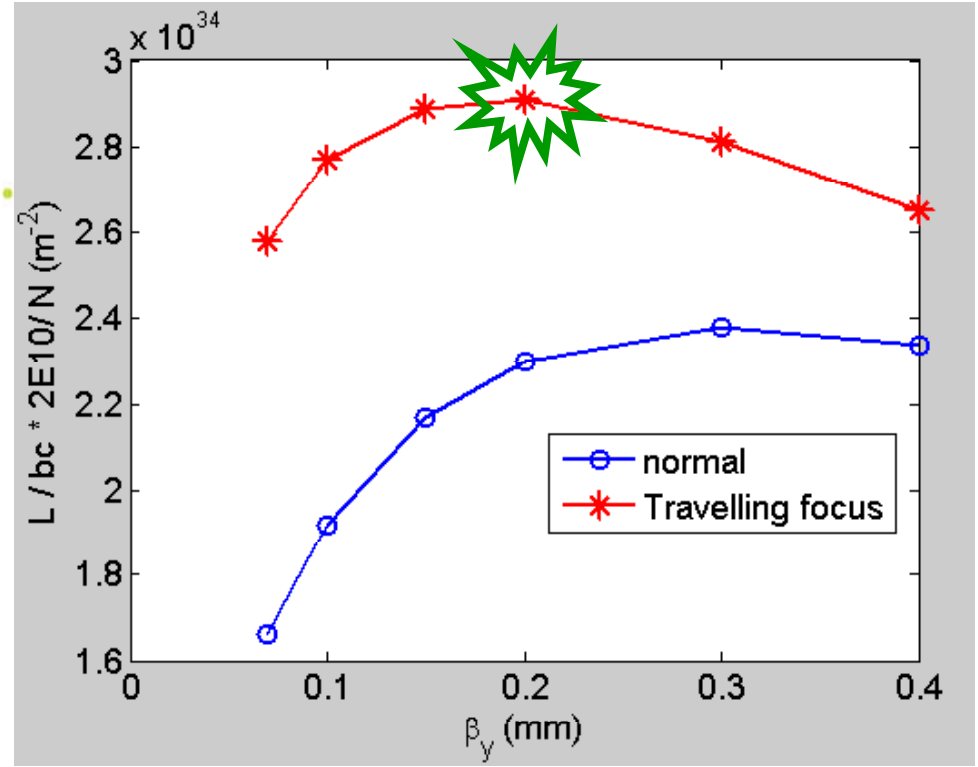
- Three critical directions:
  - –General BDS design
  - –Test facilities, ATF2
  - –Interaction Region optimization

beam dump
photon collider
crystal collimation
crab cavity
MDI diagnostics …

ATF2 commissioning & operation
Develop methods to achieve small beam size
Diagnostics, Laser Wires, Feedbacks …

IR interface document & design
SC FD prototyping and vibration test
ILC-like FD for ATF2 …

Low P



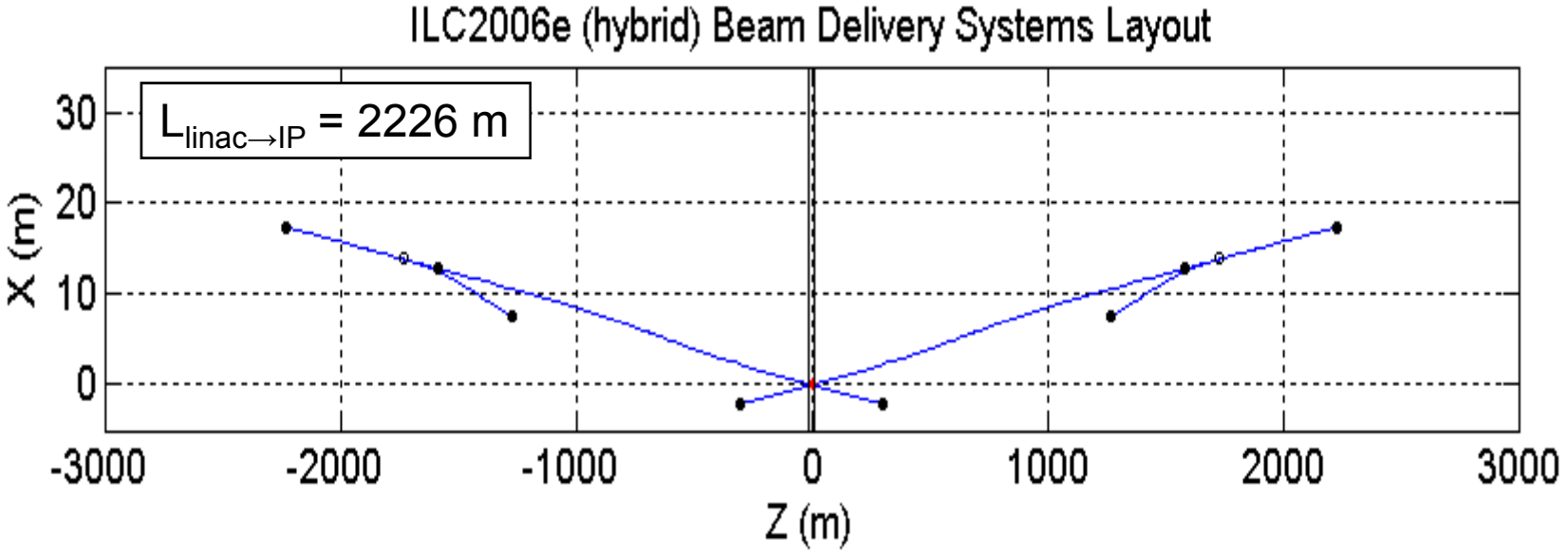
- New low P parameter set
  - **Gives 2E34 with ½ of beam power**
  - **Better for background than RDR Low P**
- Travelling focus [V.Balakin,1990] helps recovering luminosity while keeping lower beamstrahlung δ_B and Y and avoiding the need to have short bunches
  - **Rely on tighter focusing**
  - **Have higher sensitivity to beam offset at IP**

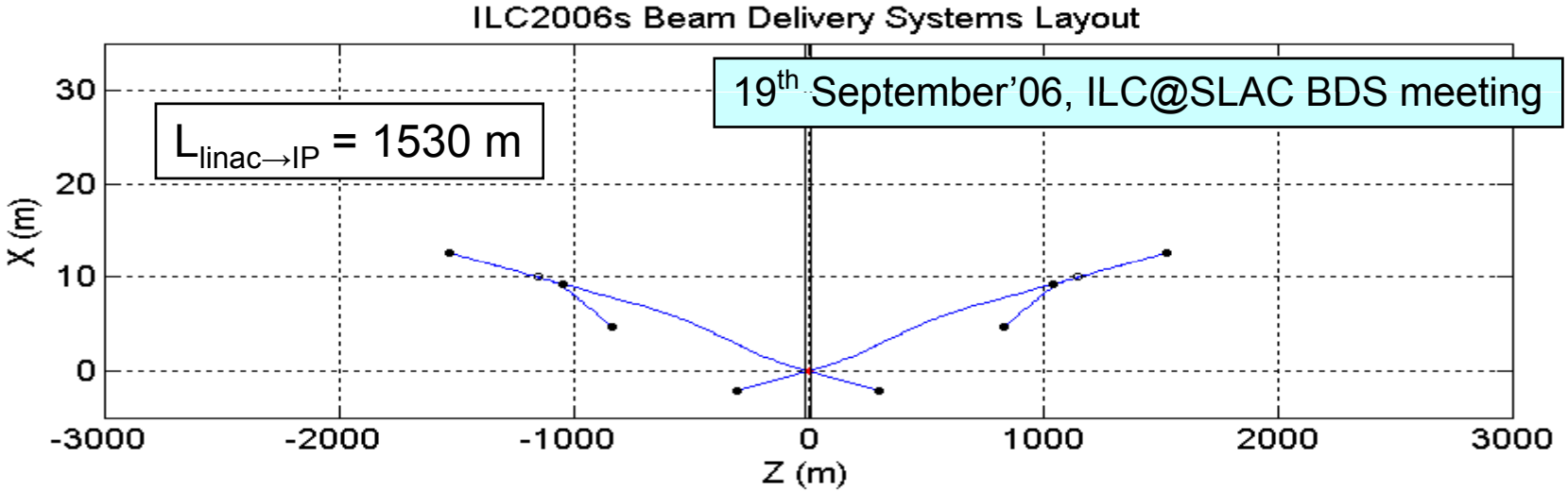
250GeV/beam non-upgradable BDS

- Have optics
- Can improve and refine it
- It could be considered for MM

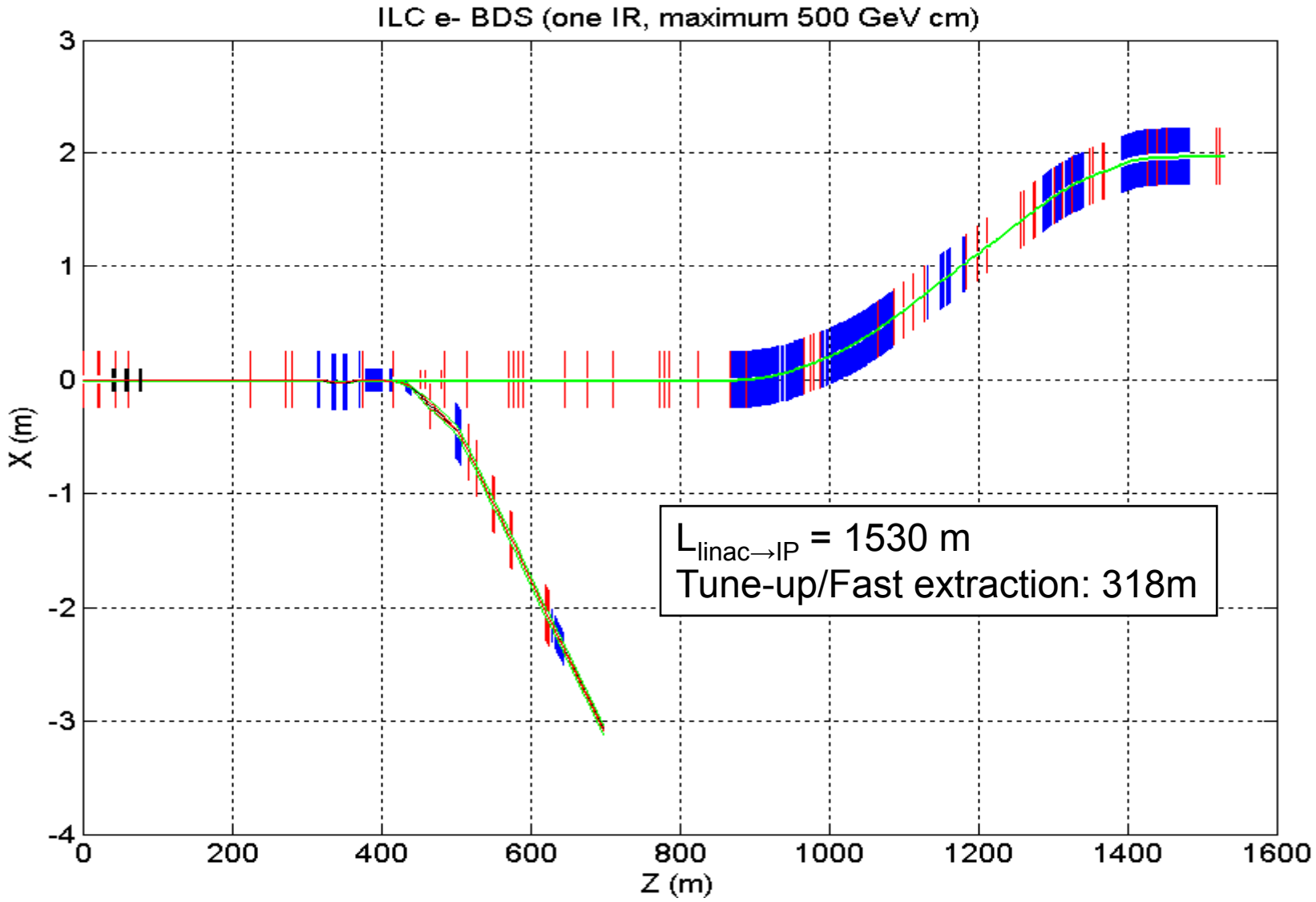
- Issues:
  - **UPGRADE**
  - **ESPECIALLY IF UNDULATOR LOCETED UPSTREAM OF BDS**

Baseline & “minimal” (250 GeV) layouts

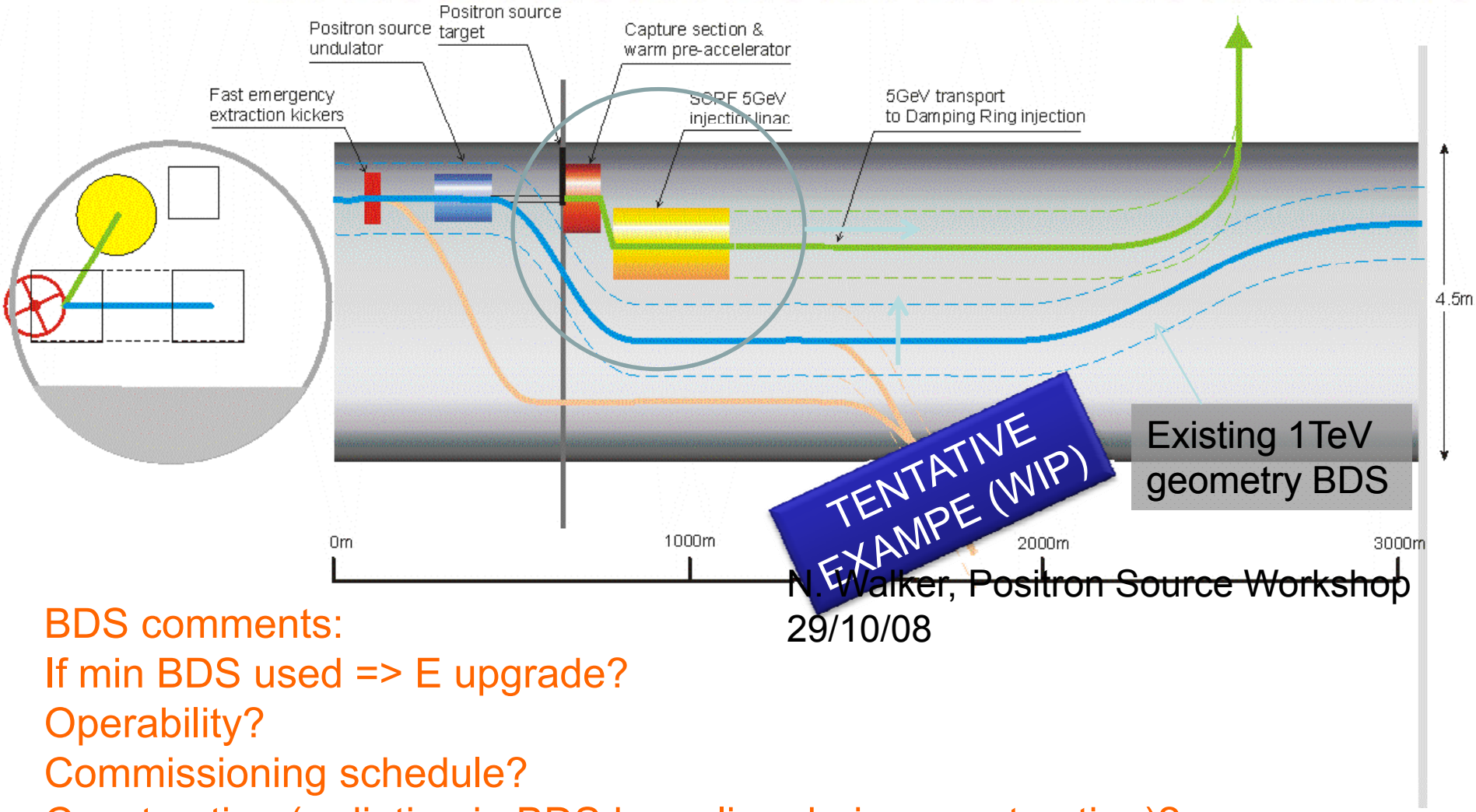




ILC2006s : Lattice details



Positron Source & BDS integration



N. Walker, Positron Source Workshop 29/10/08

BDS comments:

If min BDS used => E upgrade?

Operability?

Commissioning schedule?

Construction (radiation in BDS beamline during construction)?

Source merged into DR straight may be more natural?

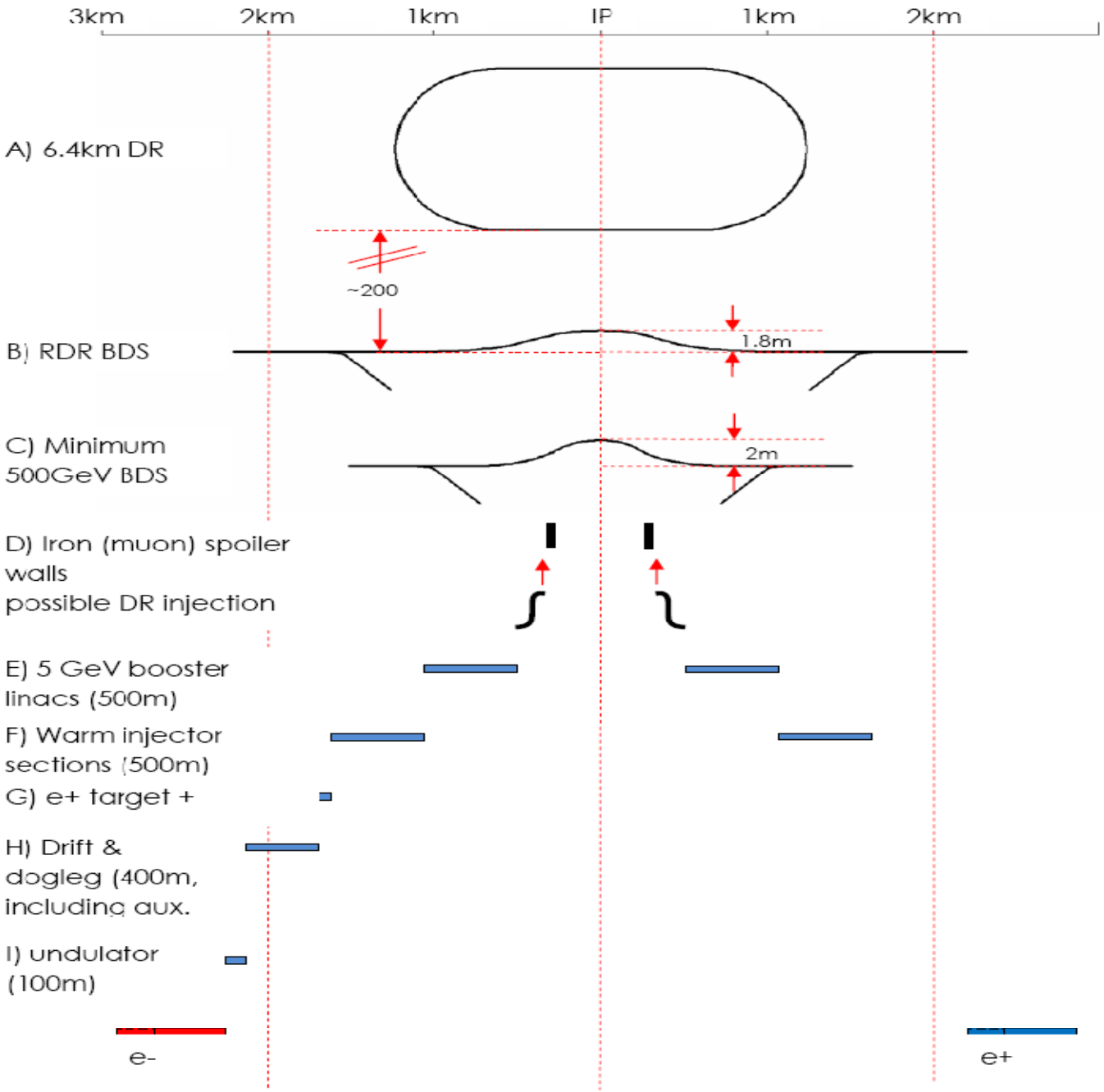


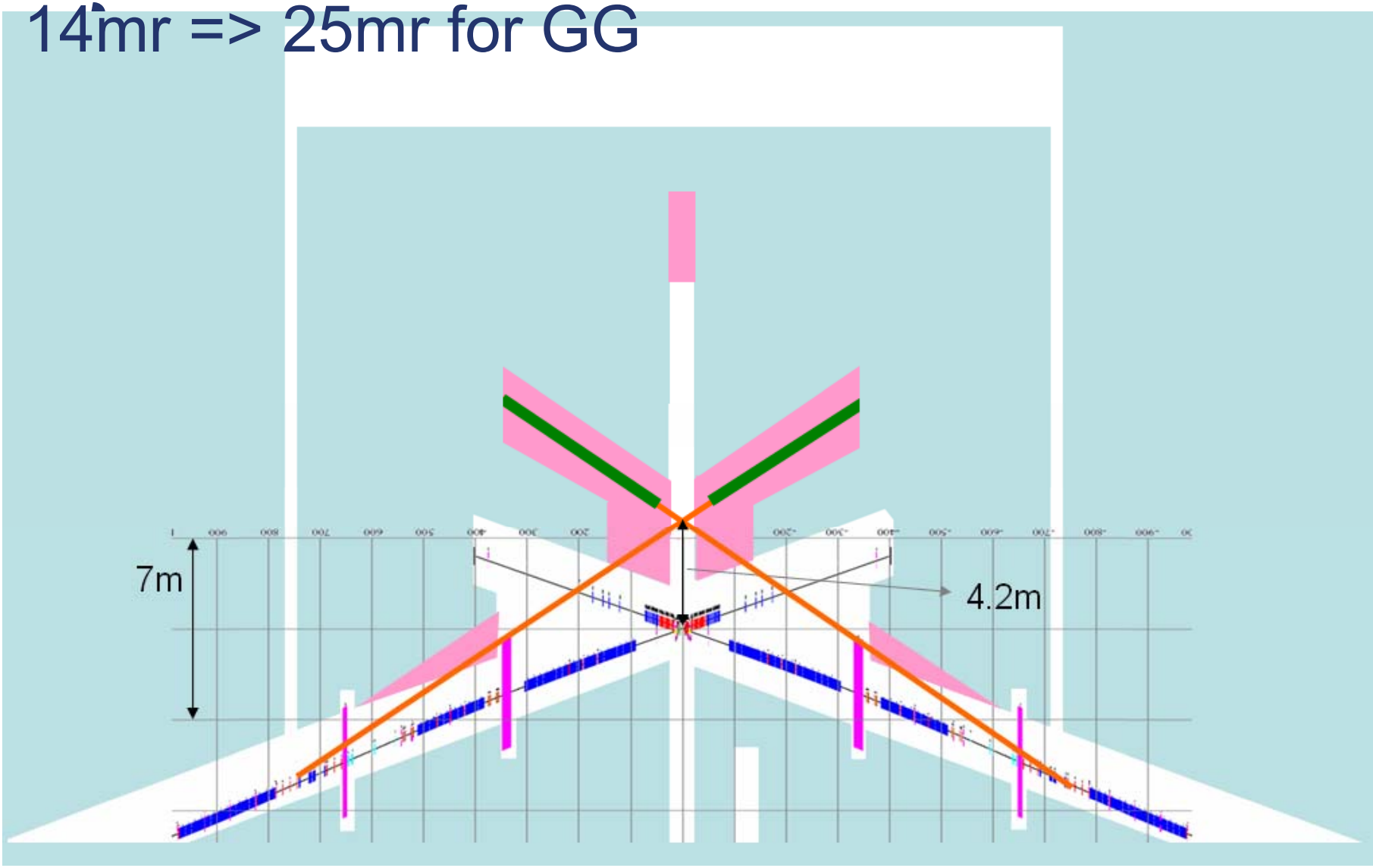
Figure 1: Approximate lengths and locations of source components and damping rings compared to both the RDR BDS and the proposed minimum 500 GeV BDS.

In parallel to MM, BDS plans..

- To study design ideas that may likely be incompatible with MM merged layout design

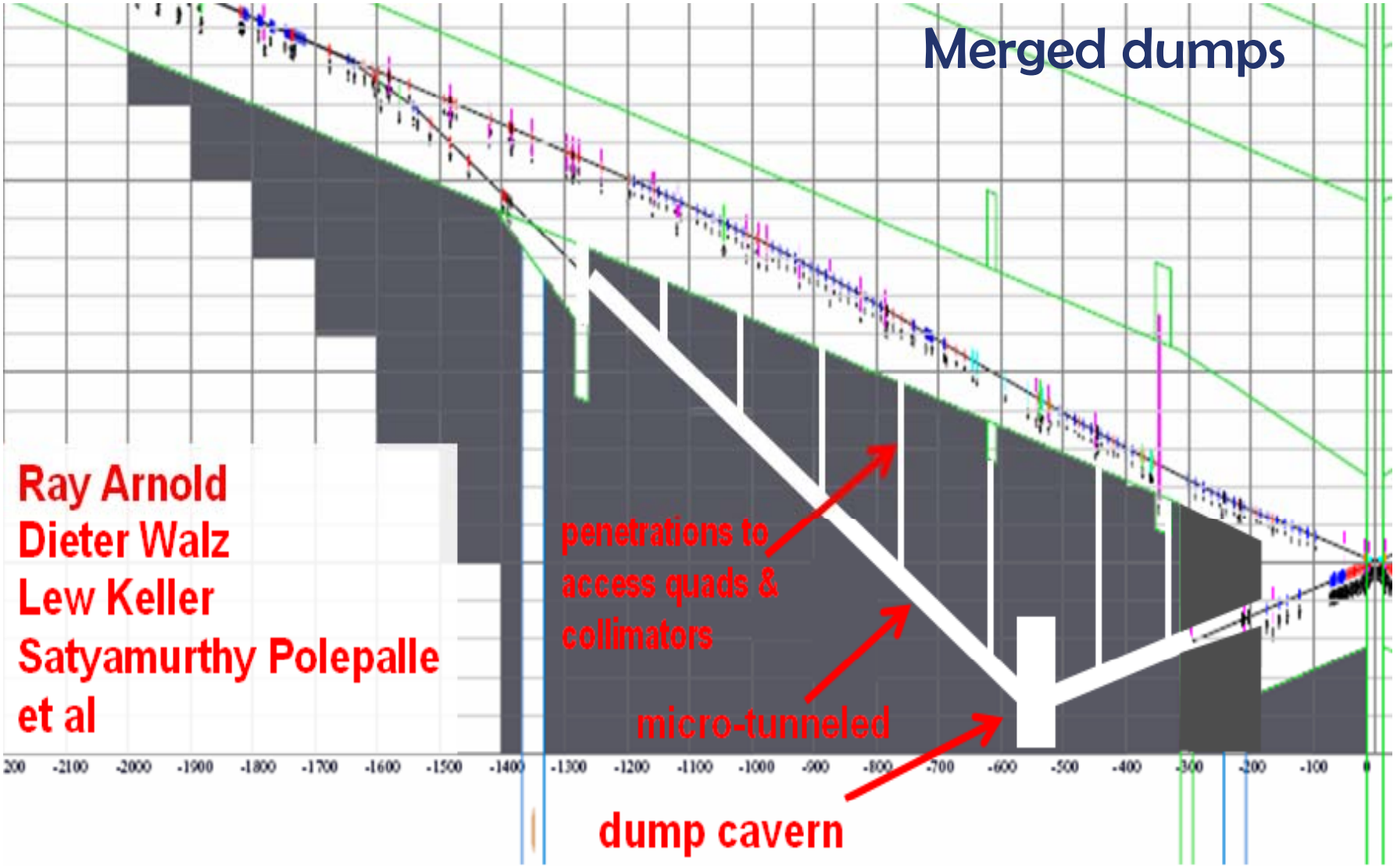
- These planned activities are
  - **gg option design, including CFS layouts**
    - for upstream BDS
    - for beam dump region
    - for possible laser or FEL near IR
  - **study merged beam dump**
  - **study doubled L* that simplify MDI**

14mr => 25mr for GG

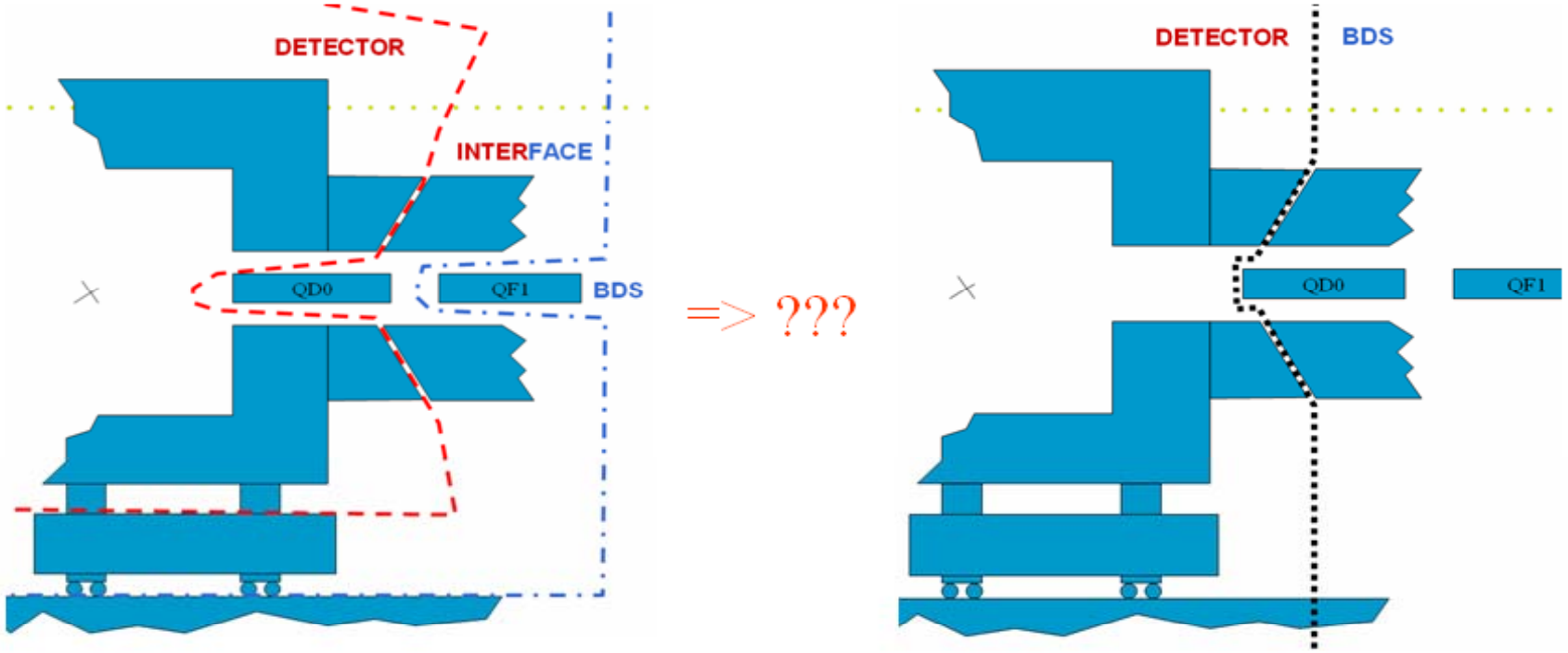


- additional angle is 5.5mrad and detector need to move by about 3-4m

Merged dumps



Simplified IR



- Longer L*, long enough to have QD0 outside of detector, separating M/D more cleanly and simplifying push-pull
  - Some impact on luminosity is unavoidable; Rvx may need to be increased
- If a longer L* design will be found viable, a question will be
  - whether to consider it as a permanent solution
  - if a Luminosity upgrade, by shortening the L*, would be considered later, after operational experience will be gained with a simpler system

Final comments

- As soon as components fit, any layout of merged source + BDS can in principle work
- BDS concerns:
  - **shorter BDS+undulator upstream => E upgrade of BDS**
  - **interference of design, construction and operation**
- Are there alternative ideas on the table?
  - **E.g. sources in straight section of DR tunnel?**

- Very general comment – is MM approach (of merged systems) sellable?