

# Working Group D Backgrounds

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**for everyone in WG D**

**IRENG07**  
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# Brief Summary of Talks

- **There were many very good talks on background issues**
  - **Upstream sources and masking**
    - **SR from bends**
    - **BGB hitting the IP and nearby masks and magnets**
  - **Downstream sources**
    - **Beam disruption**
    - **Beam bremsstrahlung**
    - **Bending the outgoing beam**
  - **General conclusions**

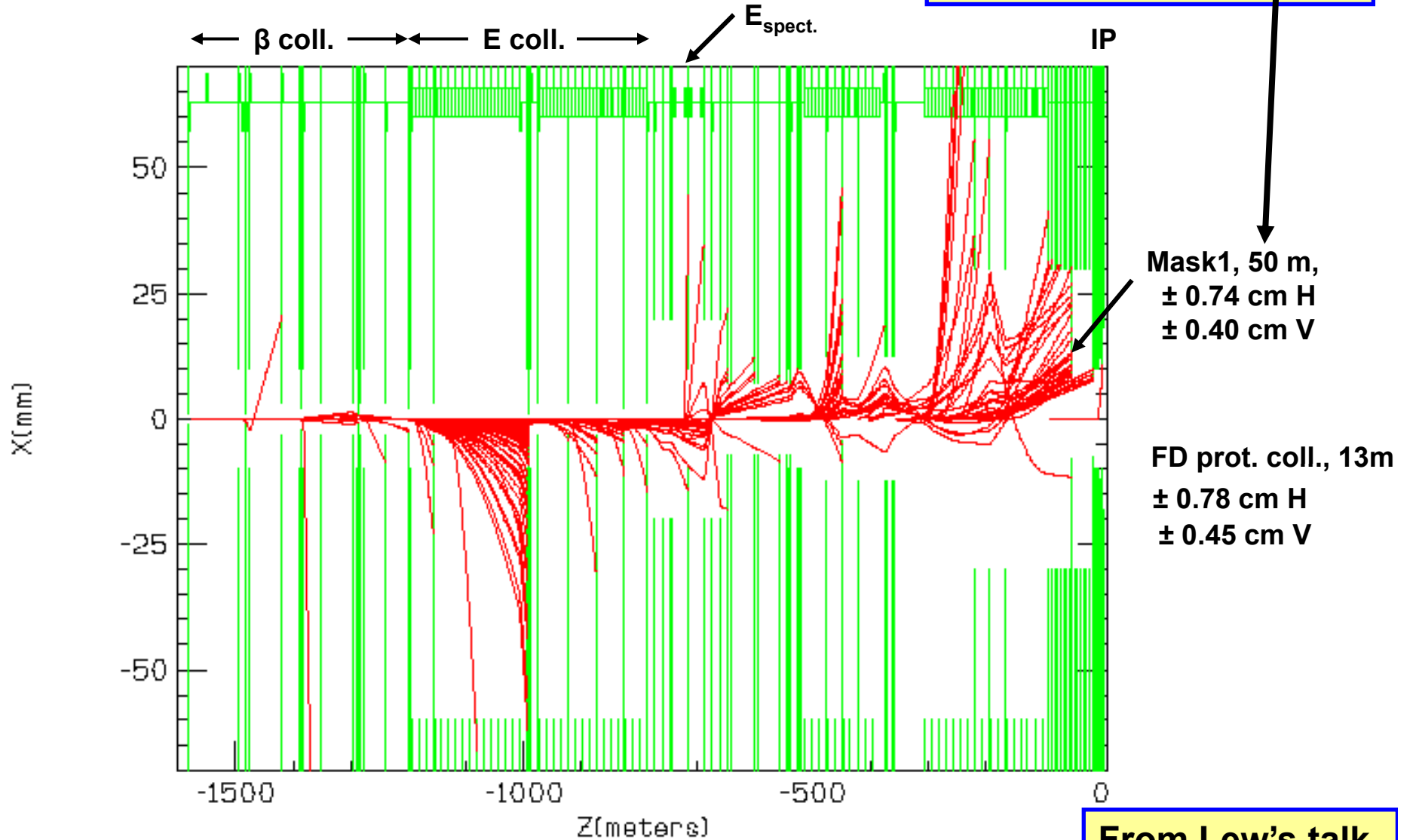
# Upstream sources

- **L. Keller on vacuum requirements**
  - Significant hit rate on the SR mask 50 m from the IP
    - Mask seems to be quite close to the detector
    - How much of a background source is this mask?
    - Muons from shower debris?
    - ....
- **F. Jackson on collimator design vs.  $L^*$**
- **S. Molloy on Transverse kicks from collimators**
  - Need to model trajectory changes from an off-axis beam through collimators?
- **Question of total external (specular) reflection from SR hitting the upstream beam pipe**
  - Might let B1 radiation get around the 50 M mask
  - Might let B2 radiation get around the 50 m mask
  - Needs to be investigated (SSRL people may be able to help)

Need 1 nT pressure  
with perhaps 100 nT  
at the IP

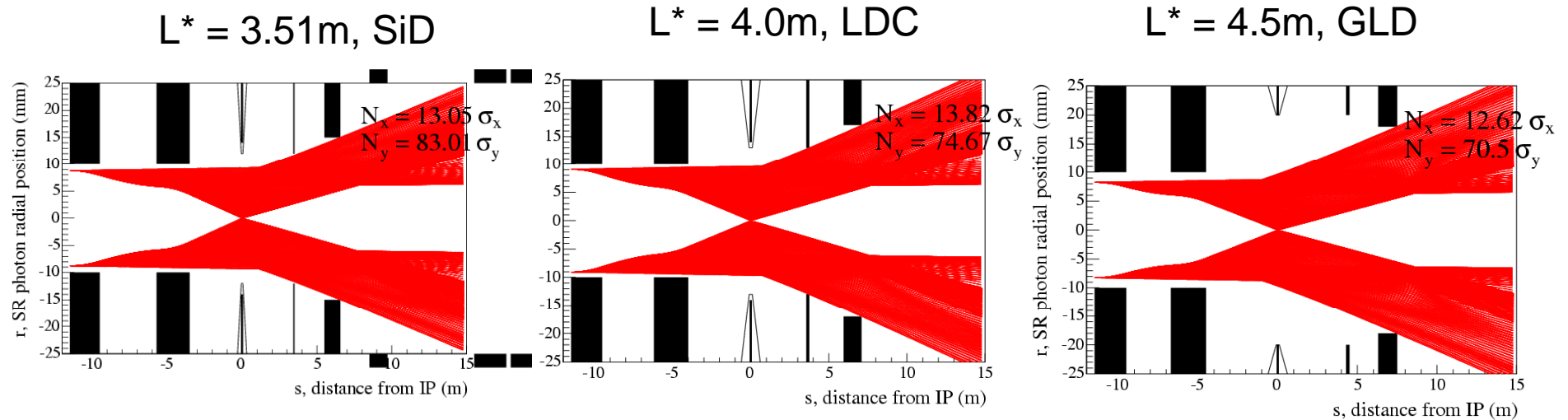
as brem. trajectories in the BL

Mask seems very  
close to the IP



From Lew's talk

# Nominal Collimation Depths



- Naively expect collimation depths to tighten as  $L^*$  increases
- Dependence on  $L^*$  is not severe
- Wider SR fan in large  $L^*$  partially compensated by wider extraction apertures

From Frank's talk

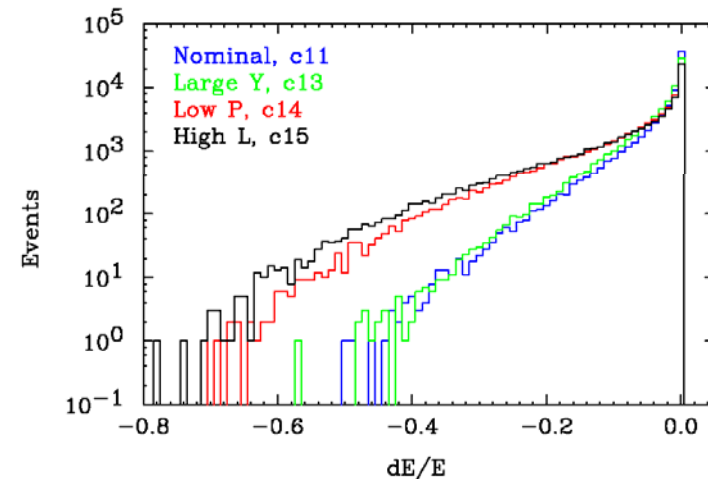
Growing cone of FD SR

# Downstream Sources

- **Great deal of work in this area – There are many things to worry about**
  - **T. Maruyama on neutron and photon backscattering**
    - He concluded that more work is needed on neutron bkgds
    - What about upstream neutron sources?
  - **R. Appleby on 2mrad IP extraction beam**
    - Added difficulty of bending the beam
    - Undisrupted beam
  - **Y. Nosochkov had a nice summary of extraction beam studies from all 3 collision designs (0, 2, 14 mrad)**
    - Have SR studies been made which include the large energy spread of the beam?
    - Undisrupted beam
  - **O. Dadoun Backscattered photons from beam losses**

# Large Energy Disruption of the Exiting Beam

- How does this affect SR calculations for the extracted beam?
- Makes life more interesting for the small angle schemes where the outgoing beam is bent



## Fast sweeping system

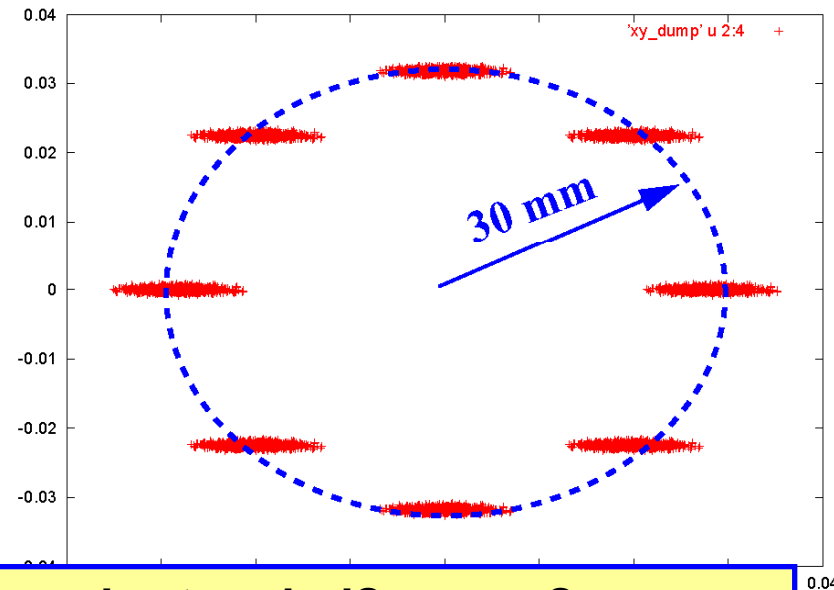
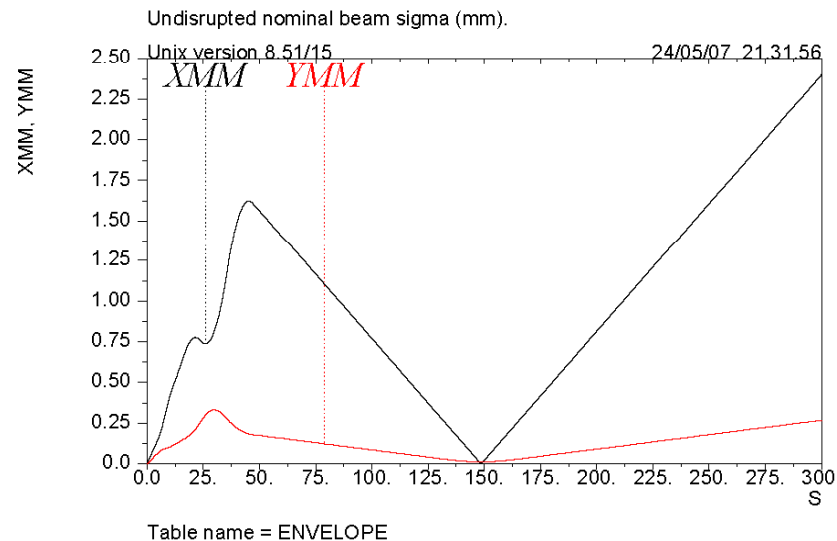
**14 mrad:** System of fast (1 kHz) X-Y kickers is included to sweep bunches of each train in one turn on 3 cm circle at the dump window. It enlarges the beam area to protect from window damage and water boiling caused by very small beam size in cases of undisrupted beam or under certain abnormal optics conditions (large errors, magnet failures).

**0 and 2 mrad:** Not in the current design, but can be included.

Undisrupted  $\sigma$  (mm)

14 mrad

Undisrupted bunches at dump



An undisrupted beam can only run for a short period? msec's?  
Not good from an operational point of view.  
Would want to be able to run a full energy undisrupted beam for hours.



# Other topics

- **HOM power in the IR (some in next talk?)**
- **FD magnet stability and alignment**
- **Lumi fast feedback**
- **Radiation Physics**
- **Magnetic Fringe Fields**
- **Gamma-gamma collider**
- **Vacuum (next talk)**

# Summary

- **A lot of good work has been done in looking at both upstream and downstream backgrounds**
- **Some concerns that I can think of (many of these may have been addressed and I don't know it)**
  - **Neutrons as a detector background**
  - **Is the 50 m SR collimator a possible background source from BGB?**
  - **Specular reflection from the upstream beam pipe**

# More concerns

- **Extraction beam**
  - Does SR modeling on the extracted beam include the beam energy spread?
  - Has the undisrupted beam been accounted for in the small angle design?
- **Is it true that the water dump can only take a very short burst of undisrupted full power beam?**
- **If yes, I tend to consider this to be an operational problem**

# A thought while trying make this summary talk

- Again, ignorance may be a problem
- Is there some sort of summary document or spreadsheet that lists all backgrounds that have been thought of and has links to write ups and/or presentations by people who have thought about or studied a particular background? Ideally it would also include a description of each background. It might also list what code was used. The background lists would no doubt be slightly different for the different collision designs.
- It would be a great help in keeping track of what has been worked on and by whom and would also be helpful in understanding if what has been done is sufficient or if more work needs to be done.
- This is a fairly big effort but I think it will payoff in the long run. It would be a big step toward a comprehensive summary of all background efforts and calculations which is going to be needed for the next ILC report

# Conclusion

- **Lots of good work**
- **More things to study**
  - **Beam misalignment cases**
  - **Collimator misalignment**
  - **Detector field effect on the beam orbit**
  - **.....**
- **More to do but it looks like backgrounds are getting under control**