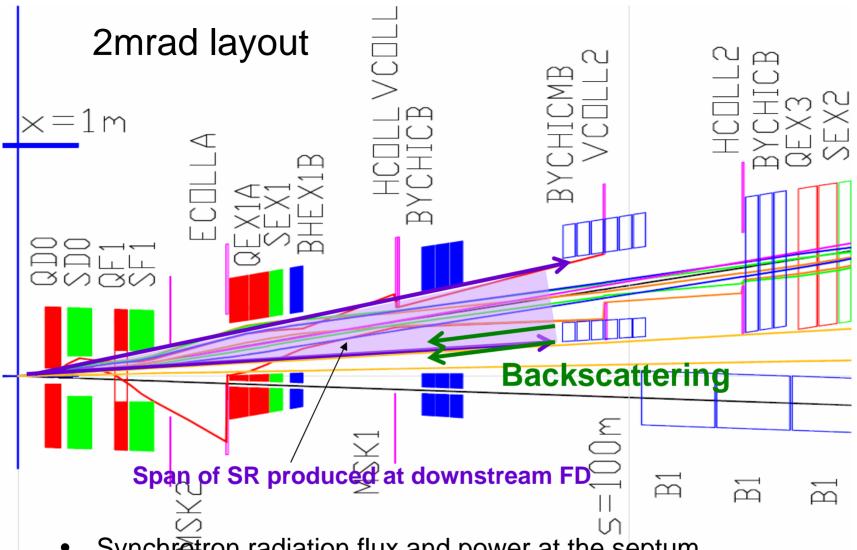
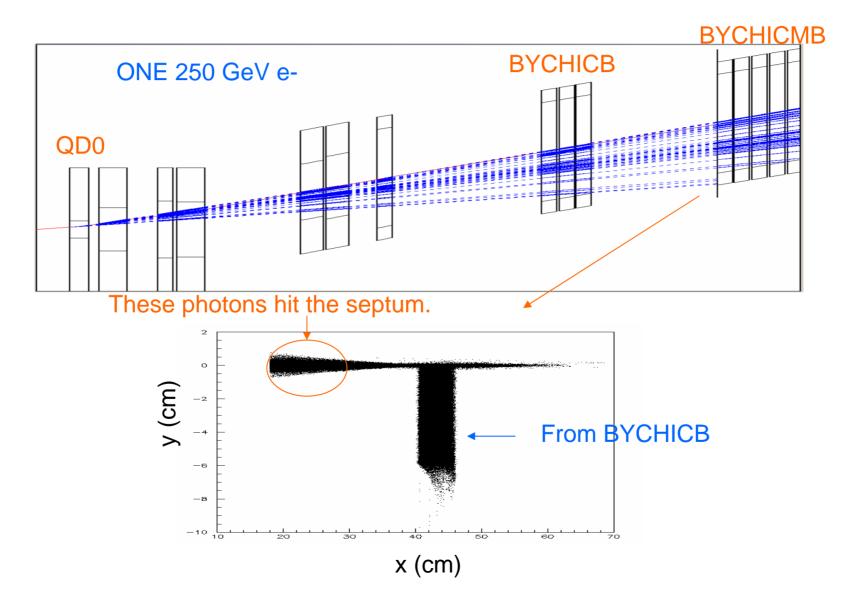
# Synchrotron radiation from 2mrad FD and backscattering from extraction line elements

T. Maruyama and A. Seryi

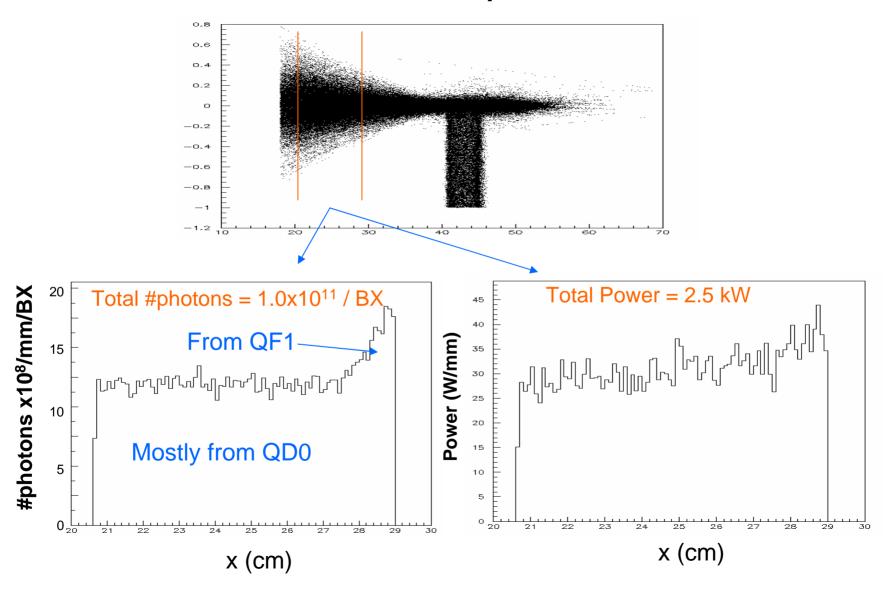


- Synchrotron radiation flux and power at the septum
- Photon flux backscattering to IP
- How it compares with the photon flux from pairs.

### SR generations



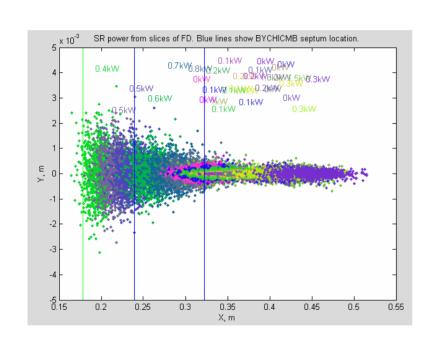
#### 250 GeV disrupted beam

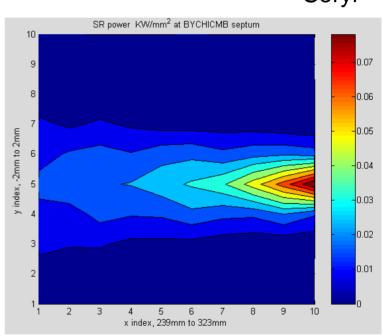


#### 250GeV/beam undisrupted beam

Turtle tracking + Analytical SR Ec + MATLAB

Seryi





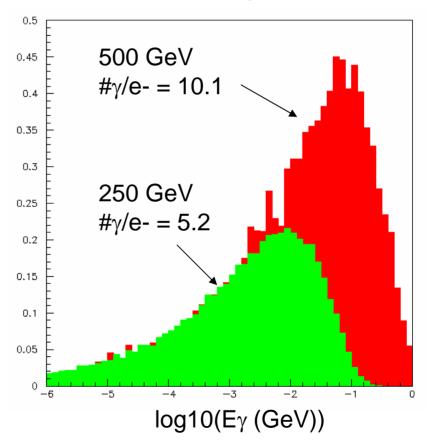
Total loss:  $\frac{dE}{E} = 0.0011578$  or  $\frac{dE}{=}12.7356$  kW

Total loss to septum: <dE>=2.8275 kW, mean Ec=21.9458 MeV

### SR rate at the septum

|         | Power<br>(kW) | <Εγ> (MeV) |  |
|---------|---------------|------------|--|
| 250 GeV | 2.5           | 11         |  |
| 500 GeV | 40.6          | 89         |  |
| 250 GeV | 3.0           | 9.5        |  |
| 500 GeV | 39.5          | 76         |  |
| 250 GeV | 2.8           | 9.8        |  |
| 500 GeV | 37.0          | 78         |  |

SR Energy dist.

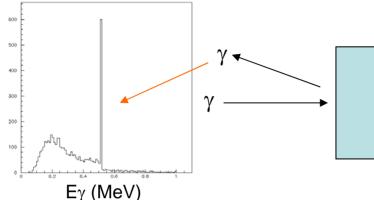


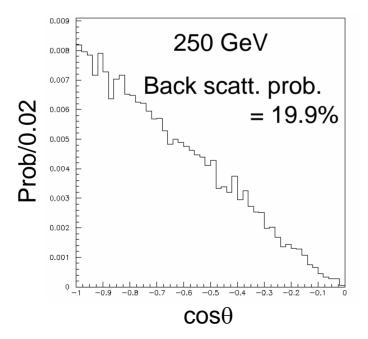
- TM disrupted beam
- AS disrupted beam
- AS undisrupted beam

 $N\gamma \sim B$ 

 $Ec \sim E_b^2 \times B$ 

## SR backscattering to IP





- To estimate the photon flux within 2 cm BeamCal aperture.
  - Find the backscattering rate in
    -1 < cosθ < -0.9</li>
  - Use the solid angle of the 2 cm aperture from z= 89m.

|         | Rate                 | #γs at<br>IP/BX | #γs in<br>SiTracker<br>from pairs |
|---------|----------------------|-----------------|-----------------------------------|
| 250 GeV | 1.1x10 <sup>-8</sup> | 2200            | 700                               |
| 500 GeV | 2.9x10 <sup>-8</sup> | 11700           | 1900                              |

### Conclusions

- SR power at the septum magnet is 2.5 kW @ 250 GeV and 40.6 kW @ 500 GeV.
- Backscattered photon flux at IP is 2200/BX @ 250 GeV and 11700/BX @500 GeV.
- The IP photon flux is x3 (250 GeV) and x6 (500 GeV) of the secondary photons from pairs.