Various Options/Concepts/Issues of Compton Sources

T. Omori (KEK)

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Our Options

1 micron laser
laser stacking
e+ stacking

10 micron laser
no laser stacking
no e+ stacking

Choice of CR circumference: Small CR or Large CR

$E_{spred\_}CR = (Ng(cycle)/Ne)^{1/2} \times \langle Eg \rangle$

Small CR C = 670 m, Ee= 1.8 GeV <Eg> = 20 MeV

300 bunches in CR

CR 10 turn ---> create 3000 bunches

DR 10 stacking/cycle ---> CR 100 turn/cycle

Ne = 4×10^{10} /bunch

Ng_turn = 2.7×10^{10} (Laser : 600 mJ x 4)

Ng_cycle/Ne = $\{(2.7 \times 10^{10}/4 \times 10^{10}) \times 100\}^{1/2} = 8$

$E_{spred\_}CR$ = 160 MeV too large!

---> small Ee, or , larger Ne and smaller laser E?, 2 micron laser, or, , ,

Large CR C = 6.7 km, Ee= 1.8 GeV <Eg> = 20 MeV expensive!

3000 bunches in CR put in DR tunnel?

CR 1 turn ---> create 3000 bunches

DR 10 stacking/cycle ---> CR 10 turn/cycle

Ne = 4×10^{10} /bunch

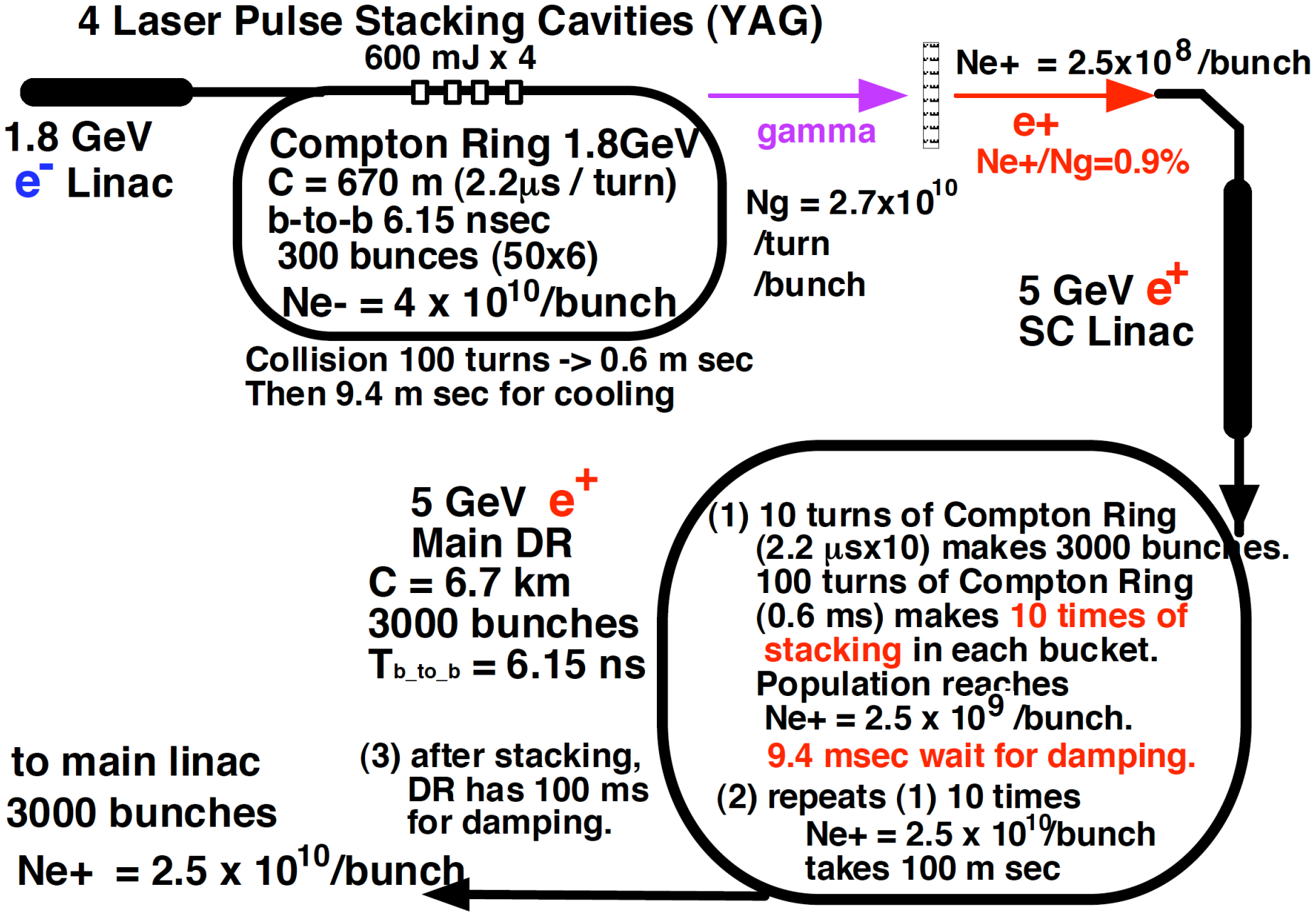
Ng_turn = 2.7×10^{10} (Laser : 600 mJ x 4)

Ng_cycle/Ne = $\{(2.7 \times 10^{10}/4 \times 10^{10}) \times 10\}^{1/2} = 2.6$

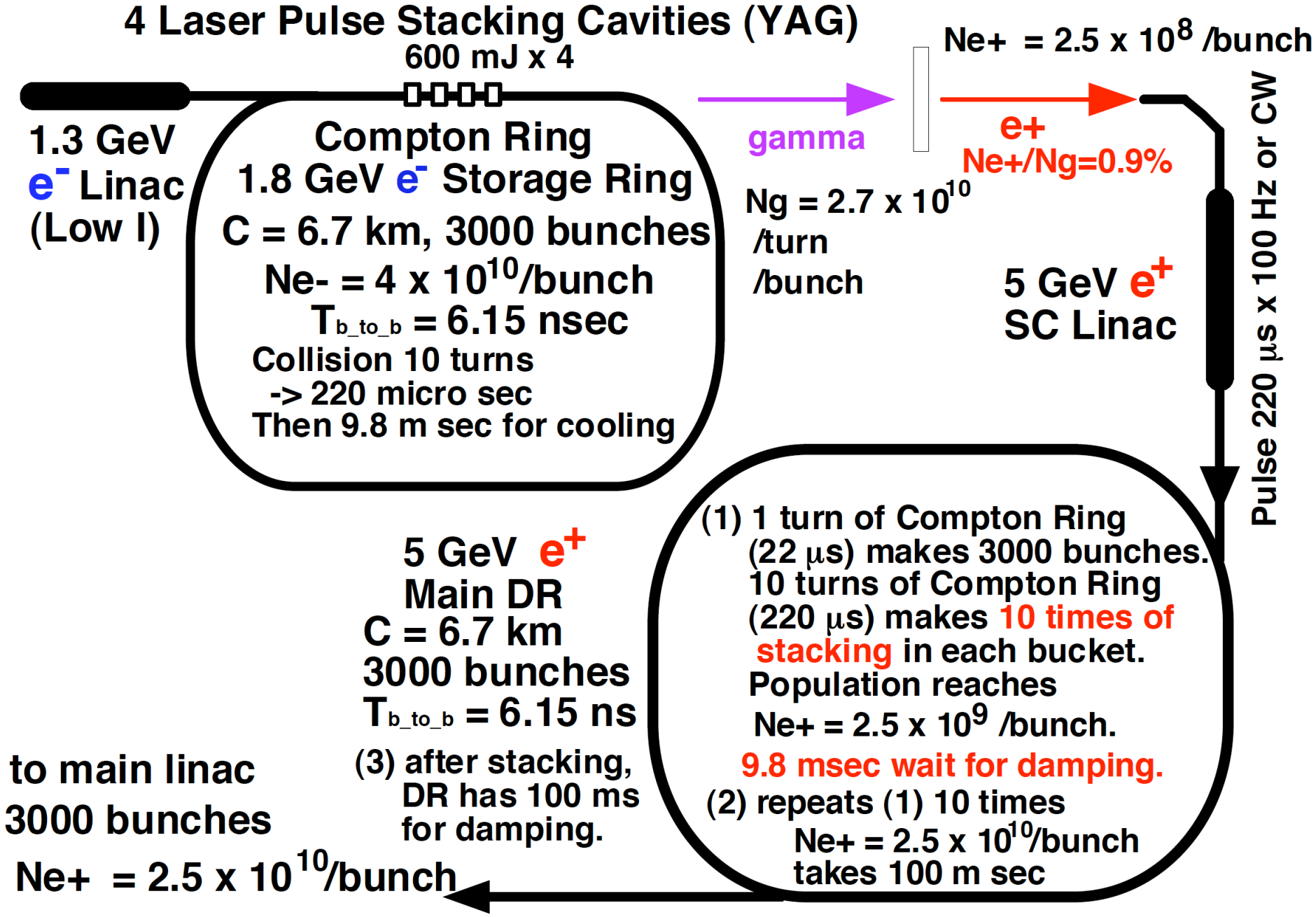
$E_{spred\_}CR$ = 52 MeV acceptable?

---> small Ee is better?, larger Ne and smaller laser E?

Compton Source for ILC (Small CR option)



Compton Source for ILC (Large CR option)



New Options ?

- Pre-DR (ILC)?
  - Pre-DR help stacking? ---> need study
  - Issue: $E_{spred\_}CR$

$$E_{spred\_}CR = (Ng(cycle)/Ne)^2 \times \langle Eg \rangle$$

CR_C = Pre-DR_C = 670 m, Ee= 1.3 GeV <Eg> = 15 MeV

300 bunches in CR

300 bunches in Pre-DR

CR 100 turn ---> create 100 x 300 bunches

Pre-DR 100 stacking/cycle ---> CR 100 turn/cycle

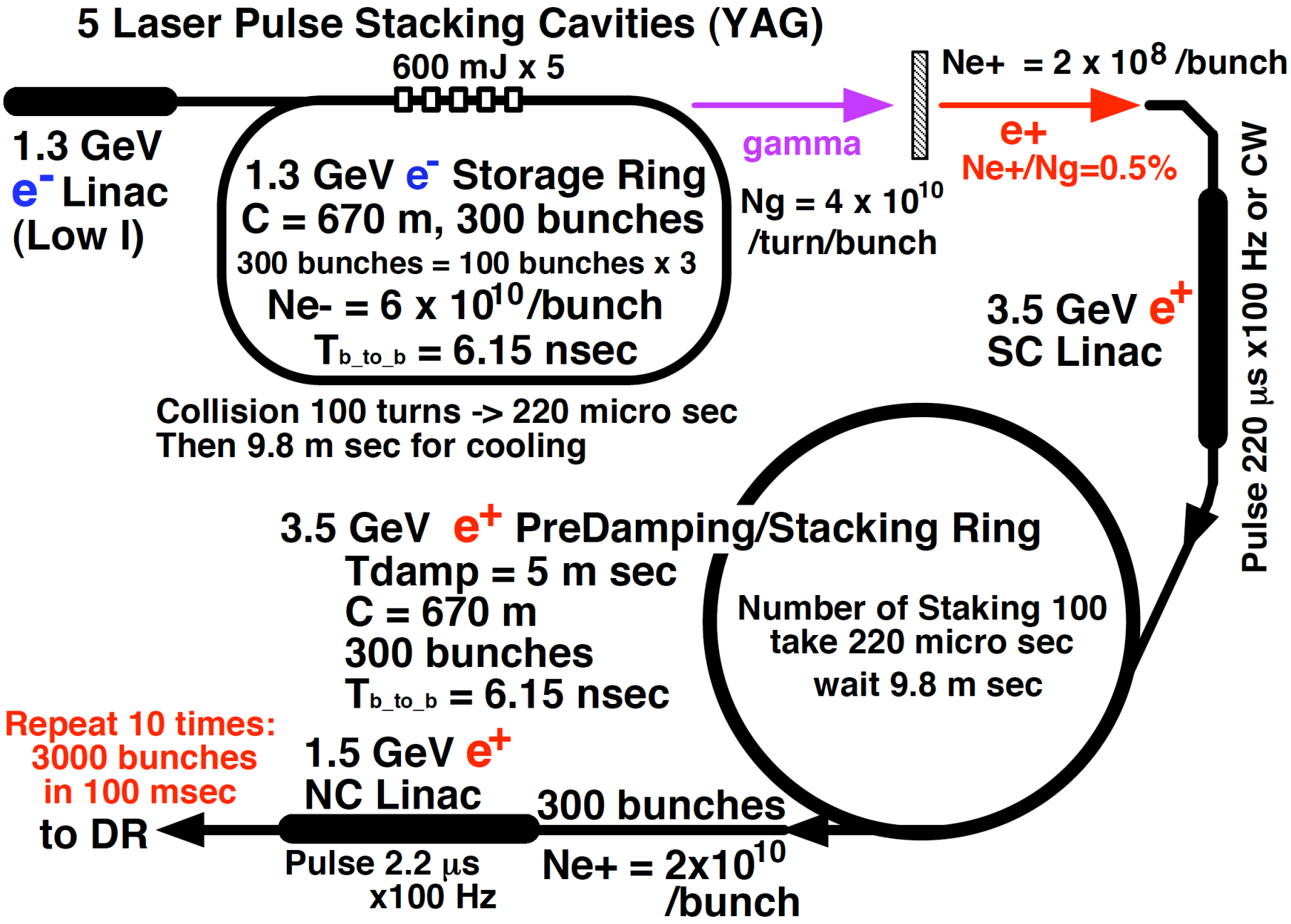
Ne = 6×10^{10} /bunch

Ng_turn = 4×10^{10} (Laser : 600 mJ x 5)

Ng_cycle/Ne = $\{(4 \times 10^{10}/6 \times 10^{10}) \times 100\}^{1/2} = 8$

$E_{spred\_}CR$ = 120 MeV too large!

Compton Source for ILC (Pre-DR option)



New Options ?

- **e+ stacking in Linac scheme**

10 micron laser

no laser stacking

e+ stacking (<10)

assume : Linac 300 Hz, 100 bunches/train

needs "80 m sec" to get 2600

no time remains for stacking

assume : Linac 600 Hz, 100 bunches/train

needs "10 m sec" to get 1300 (Minimum Machine)

we have time for 4 stacking

Summary

- **Many Options/Concepts/Issues are summarized.**

- **ILC Minimum Machine Option**
  Many things go to little easier

- **Necessary number of consideration are twice more.**
  for ILC and for CLIC