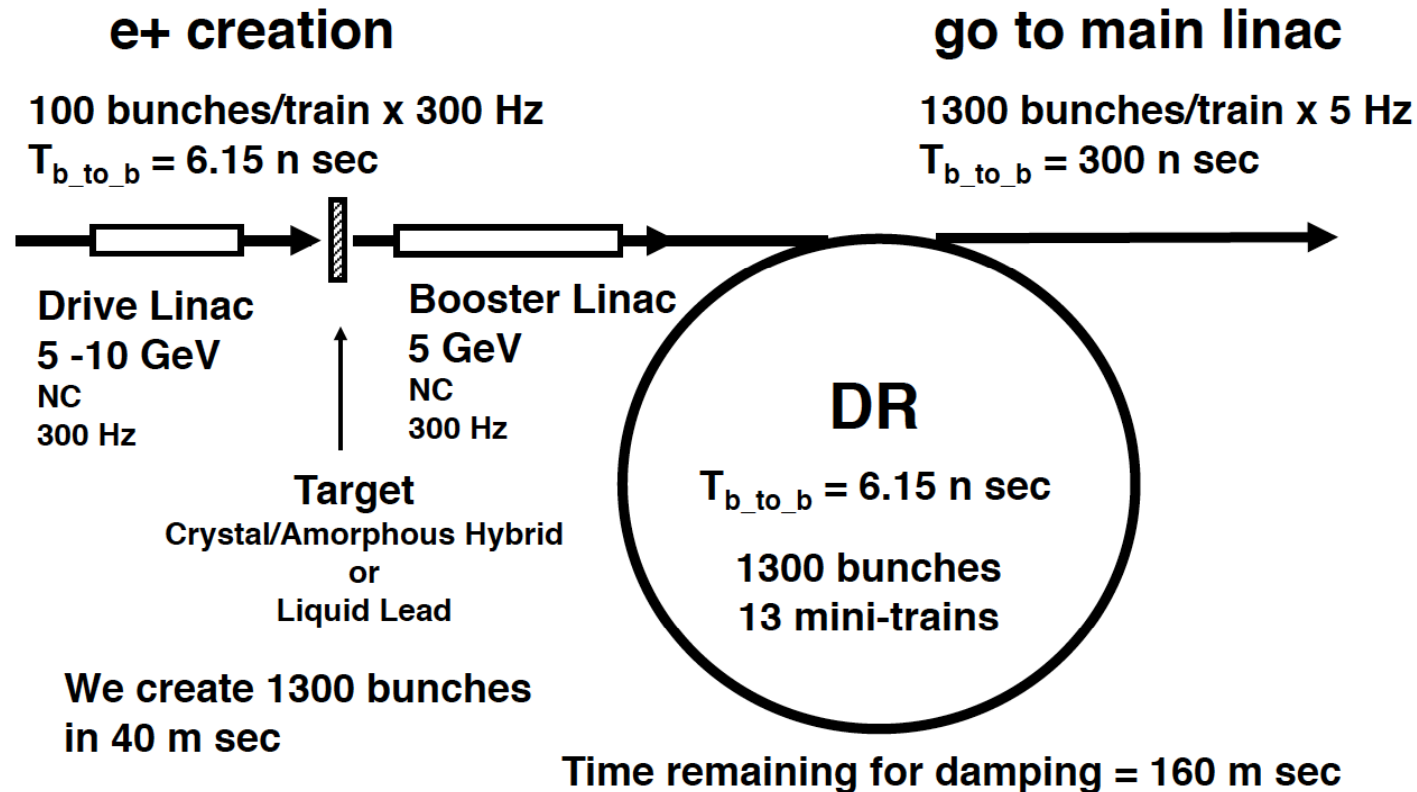


300 Hz e^+ Generation for ILC MM with advanced conventional e^+ sources



T. Omori (KEK)

17-Nov-2008, GDE meeting, Chicago

Many thanks to Chehab-san, Logachev-san, Urakawa-san, Kuriki-san, Takahashi-san,
Kamitani-san, Louis-san

Generate e^+ s in 40 m sec

**e^+ generation of ILC : quite tough
even in Minimum Machine (MM)**

Conventional e^+ source:

- only e^+ source which we have experience in real accelerators**
- target survivability?**

300 Hz generation: make e^+ s in 40 m sec.

40 m sec make target easy

How?

- **Minimum Machine: 1300 bunches**
- **Divide into 13 mini-trains**
- **Each mini-train contains 100 bunches**
- **$1300 = 13 \times 100$**
- **300 Hz creation of mini-trains**
mini-train to mini-train = 3.3 m sec
- **Create 13 mini-trains : 40 m sec**

Comparison to Warm Machines

GLC/NLC (warm LC)

$$N_{e^+/\text{bunch}} = 0.7 \times 10^{10}$$

$$N_{\text{bunch}/\text{train}} = 300$$

2-3 targets (conventional)

150 Hz (6.7 m sec train to train)

ILC MM (cold LC)

$$N_{e^+/\text{bunch}} = 2 \times 10^{10}$$

$$N_{\text{bunch}/\text{train}} = 1300 = 13 \times 100$$

x 3

x 1/3

300 Hz generation: similar to warm machines

in it's time structure

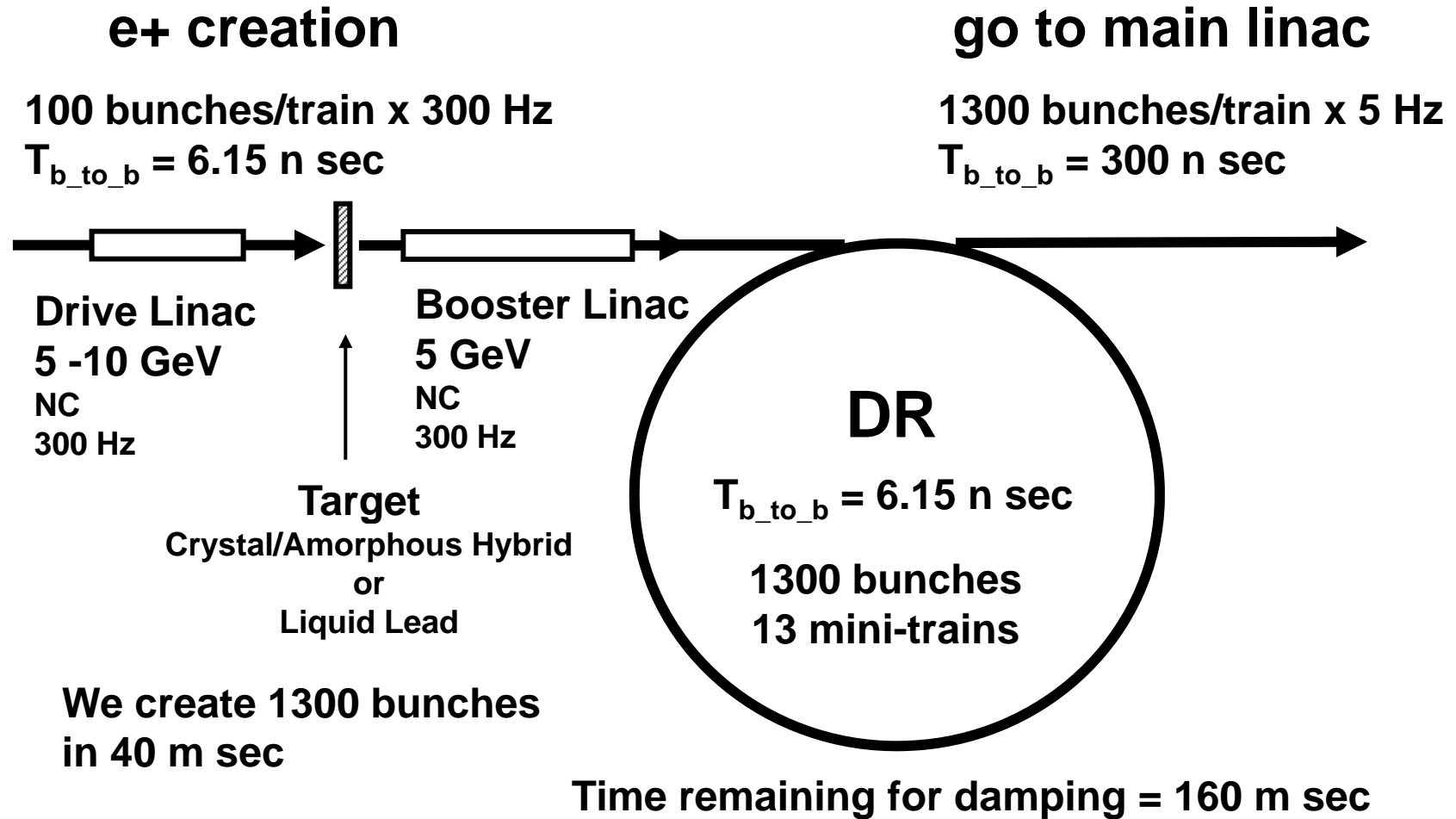
in view point of target thermal/shock issues

300 Hz generation: takes 40 m sec

$$3.3 \text{ m sec}(300 \text{ Hz}) \times (13-1) = 40 \text{ m sec}$$

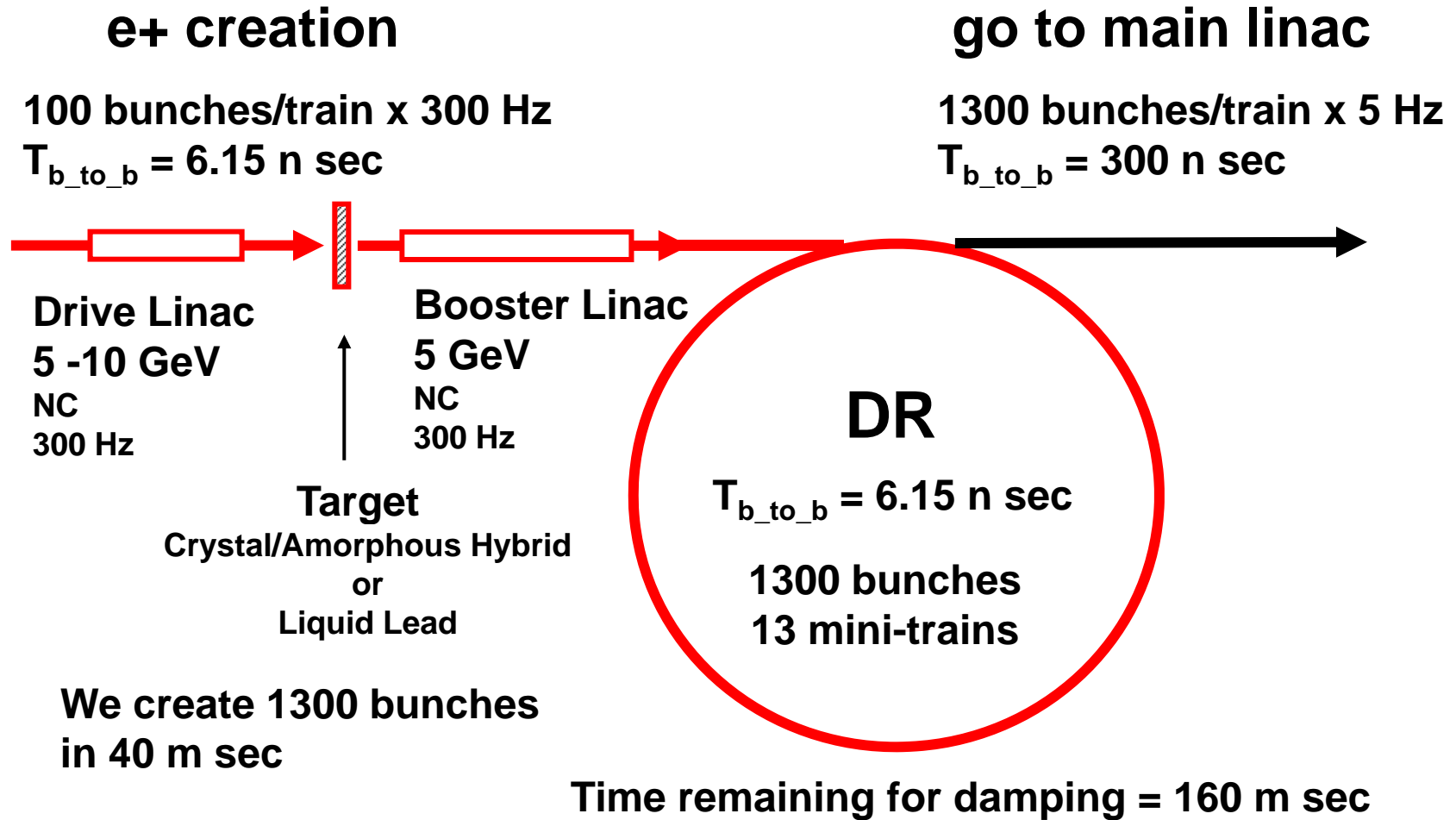
300 Hz Advanced Conventional e⁺ Source for MM

Crystal/Amorphous Hybrid Target or Liquid Lead Target
Normal Conducting Drive and Booster Linacs in 300 Hz operation

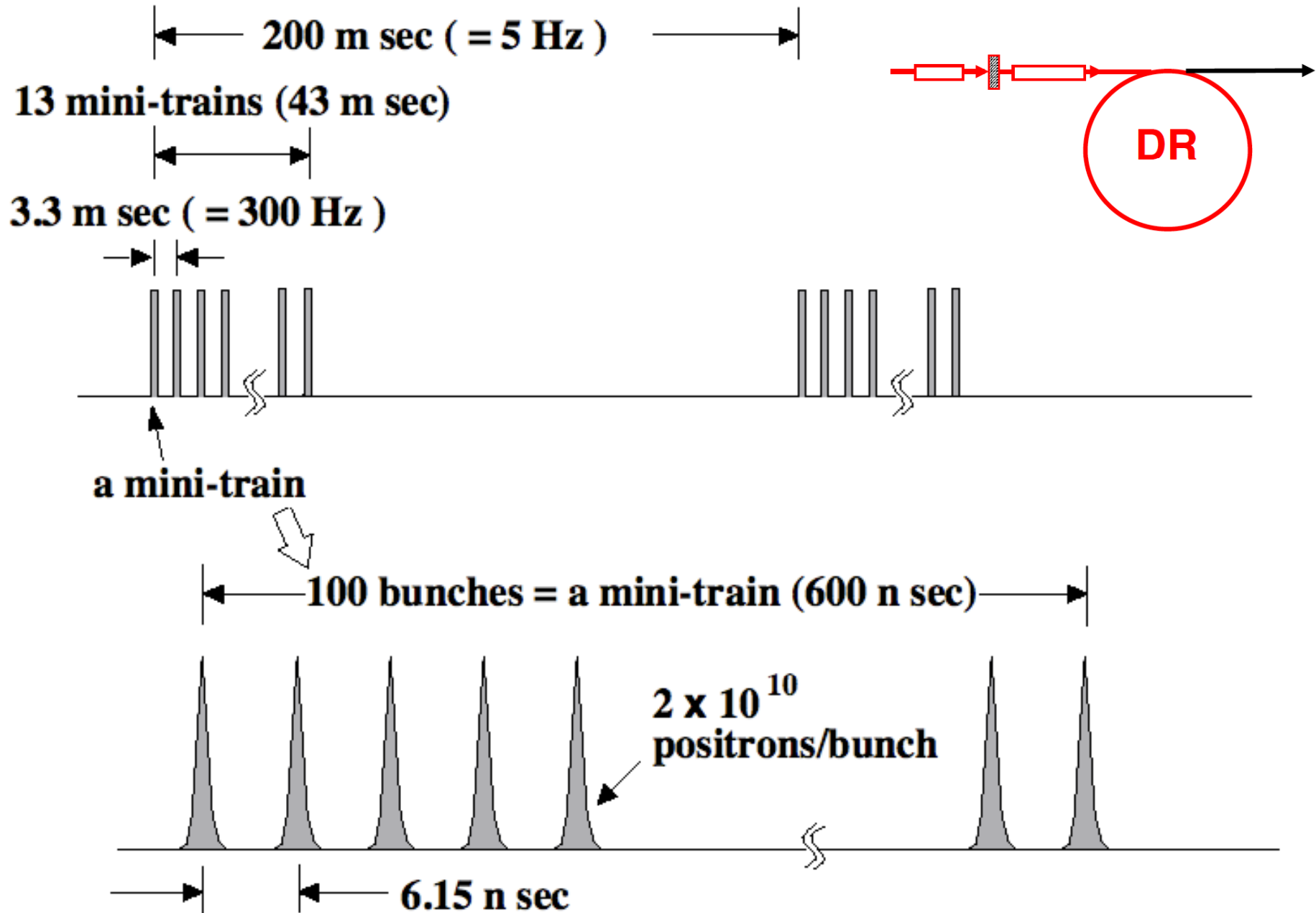


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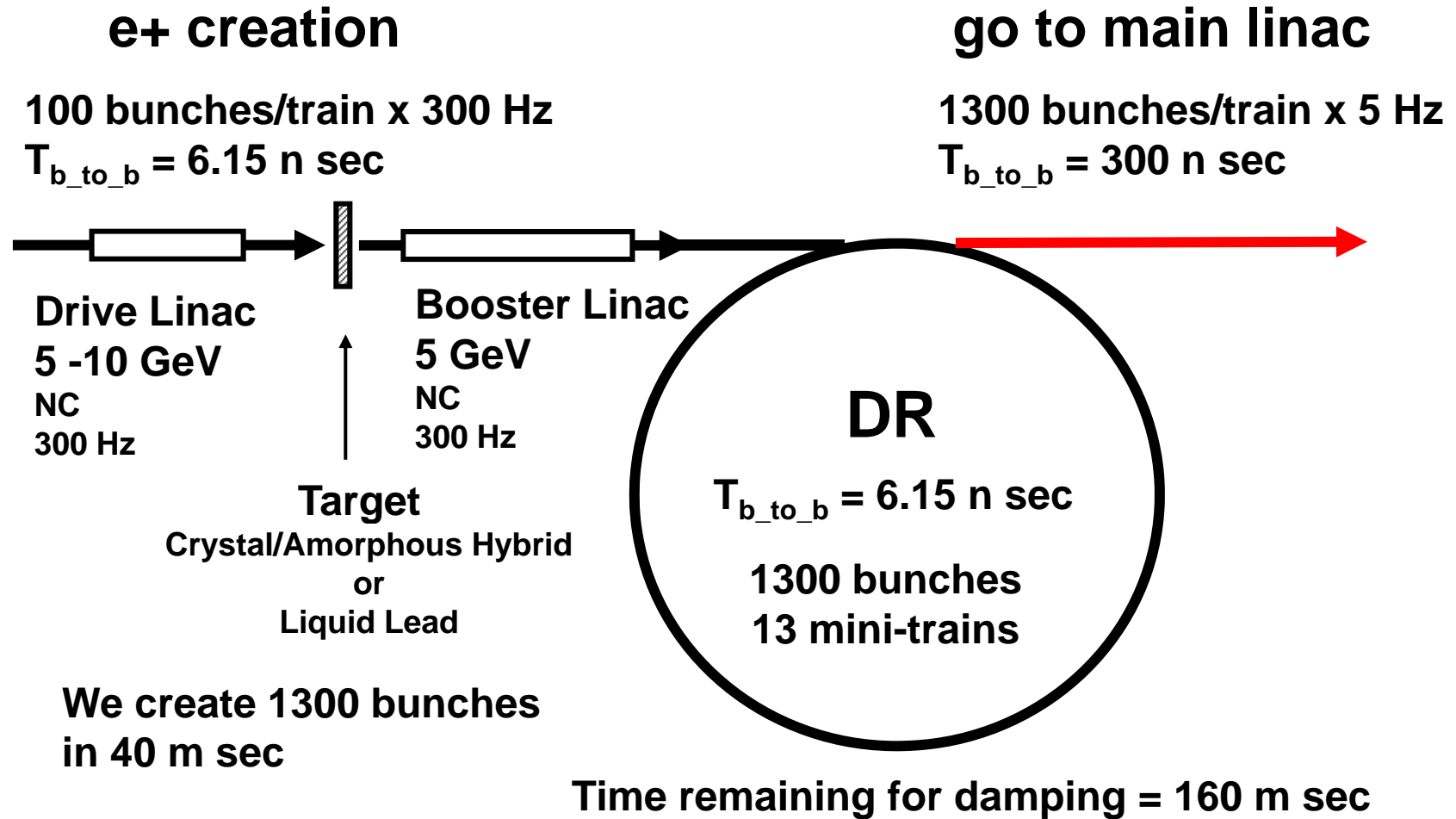


ILC MM beam before/in DR

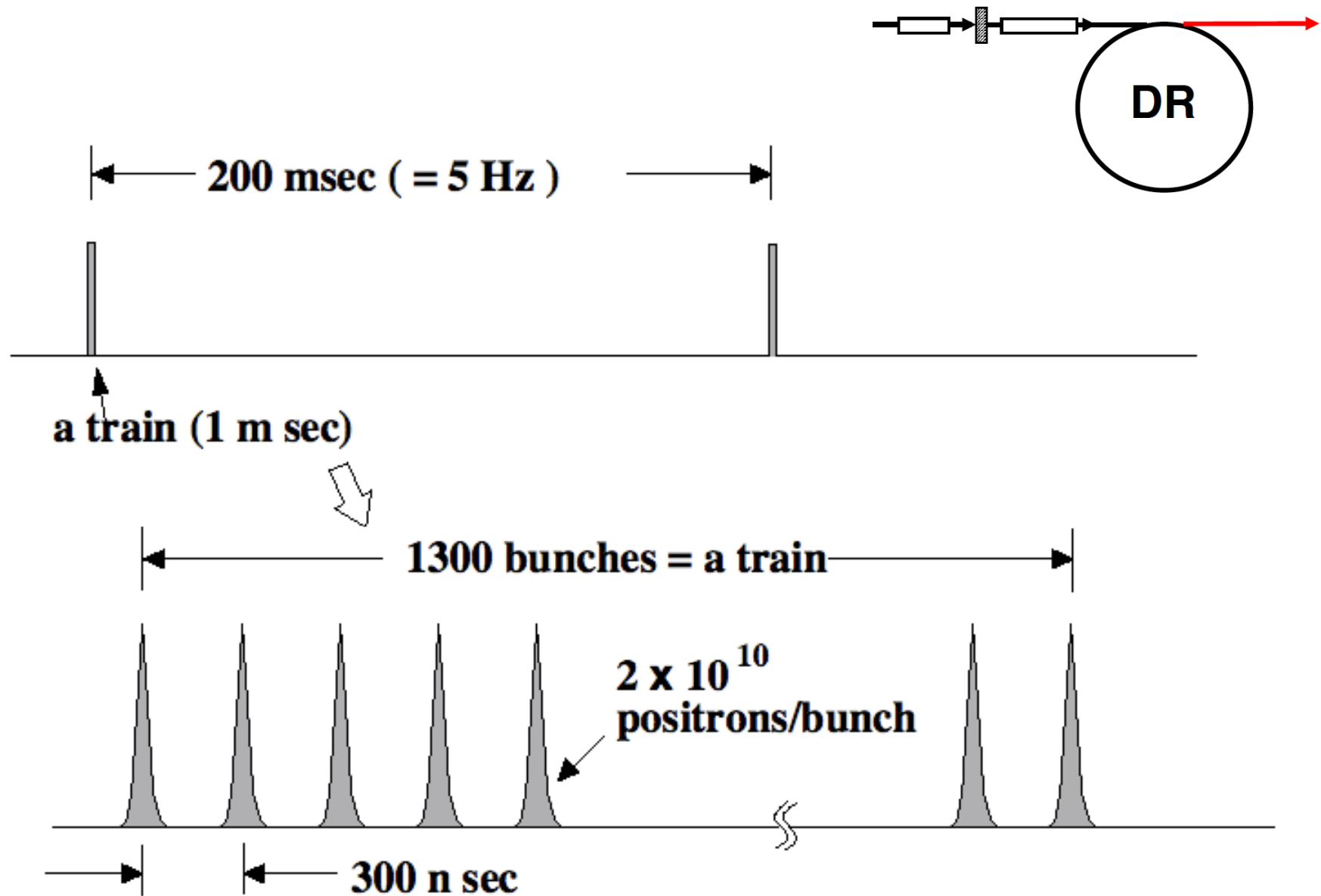


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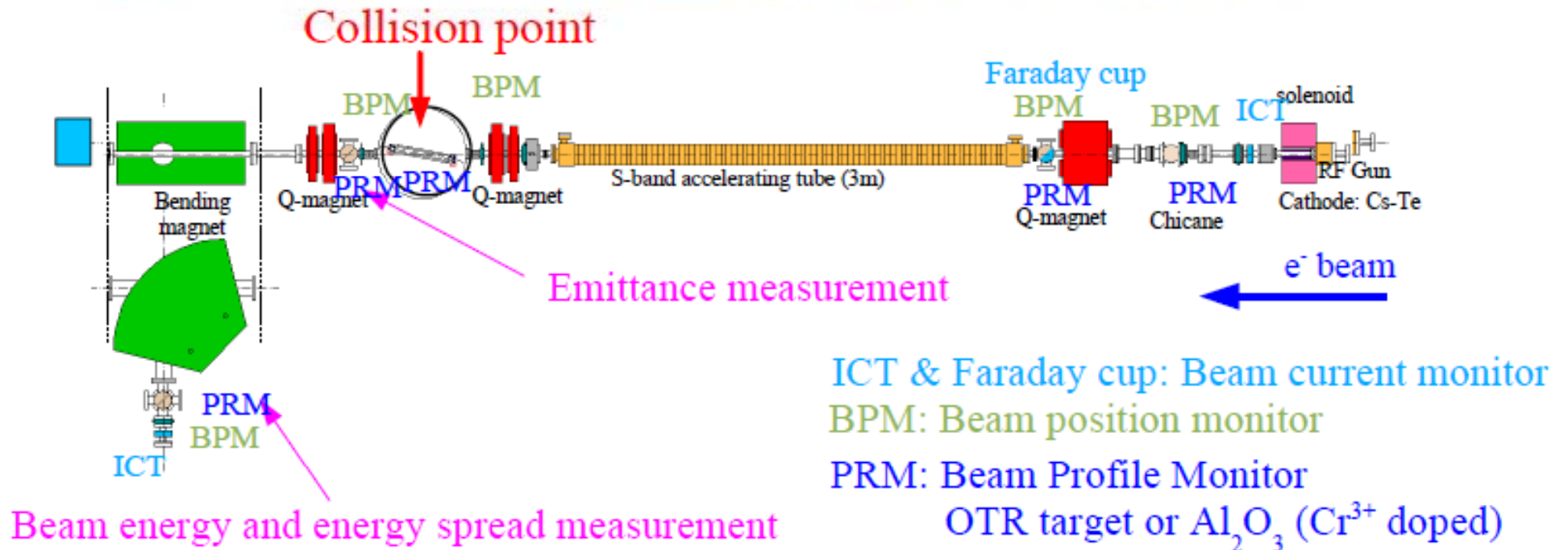


ILC MM beam after DR



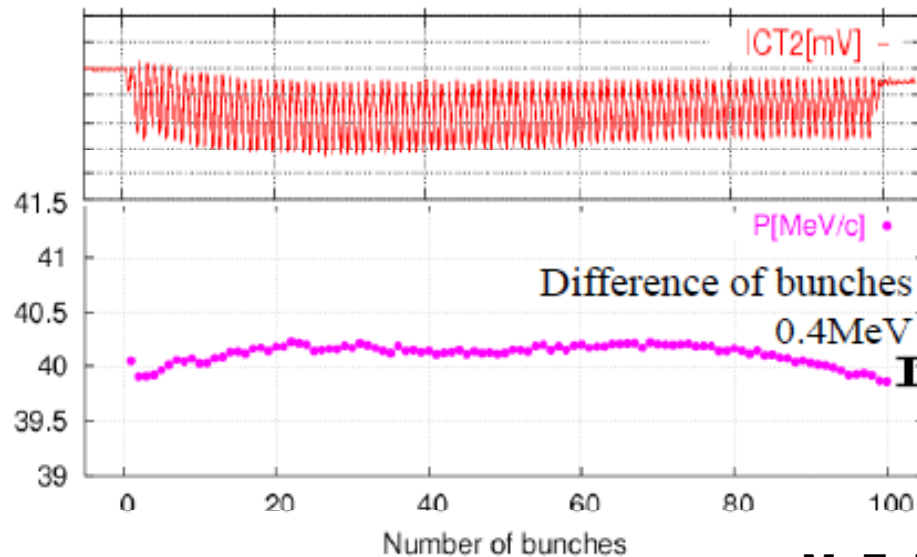
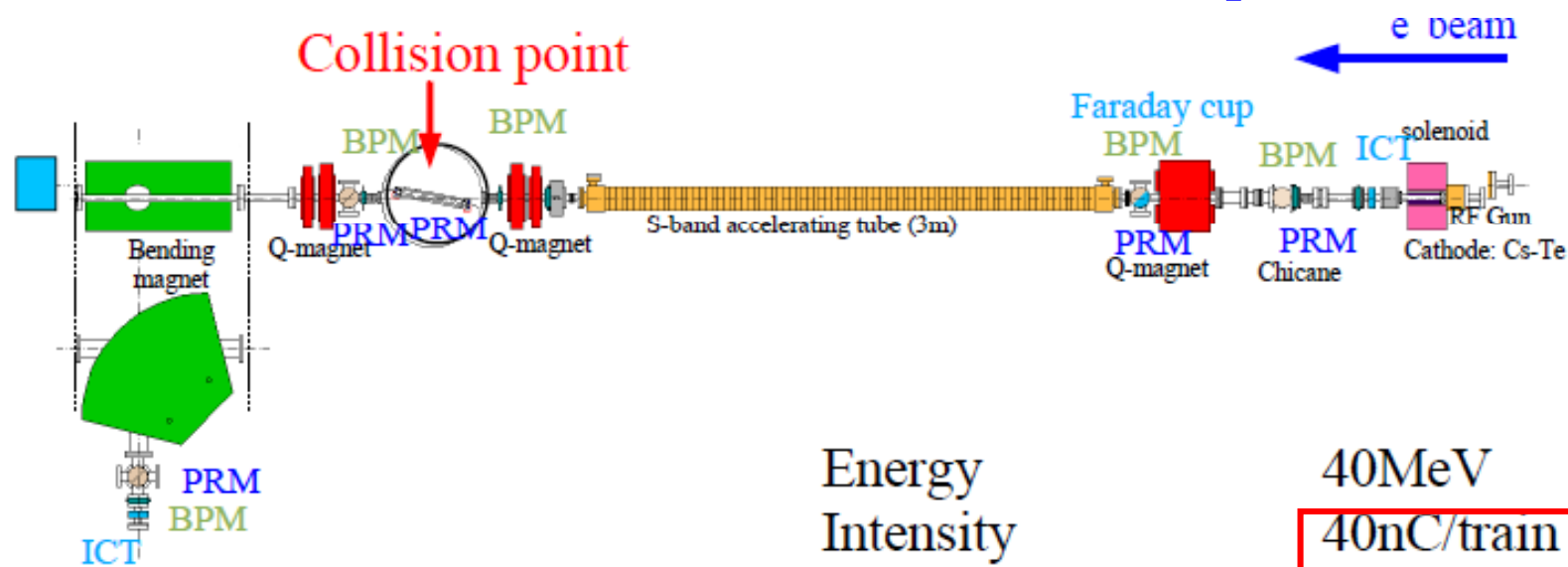
100 bunch beam is in operation

LUCX Project in KEK



M. Fukuda

100 bunch beam is in operation



Energy	40MeV
Intensity	40nC/train (0.4nC/bunch)
Number of Bunch	100bunches/train
Bunch spacing	2.8ns
Rep. Rate	3.13Hz
Emittance	8-10 [π mm mrad]
Energy Spread	0.12% (r.m.s.)
Beam size at C.P.	80um x 40um

Near future (2009)

add a klystron

5 nc/bunch x 100 bunches

M. Fukuda

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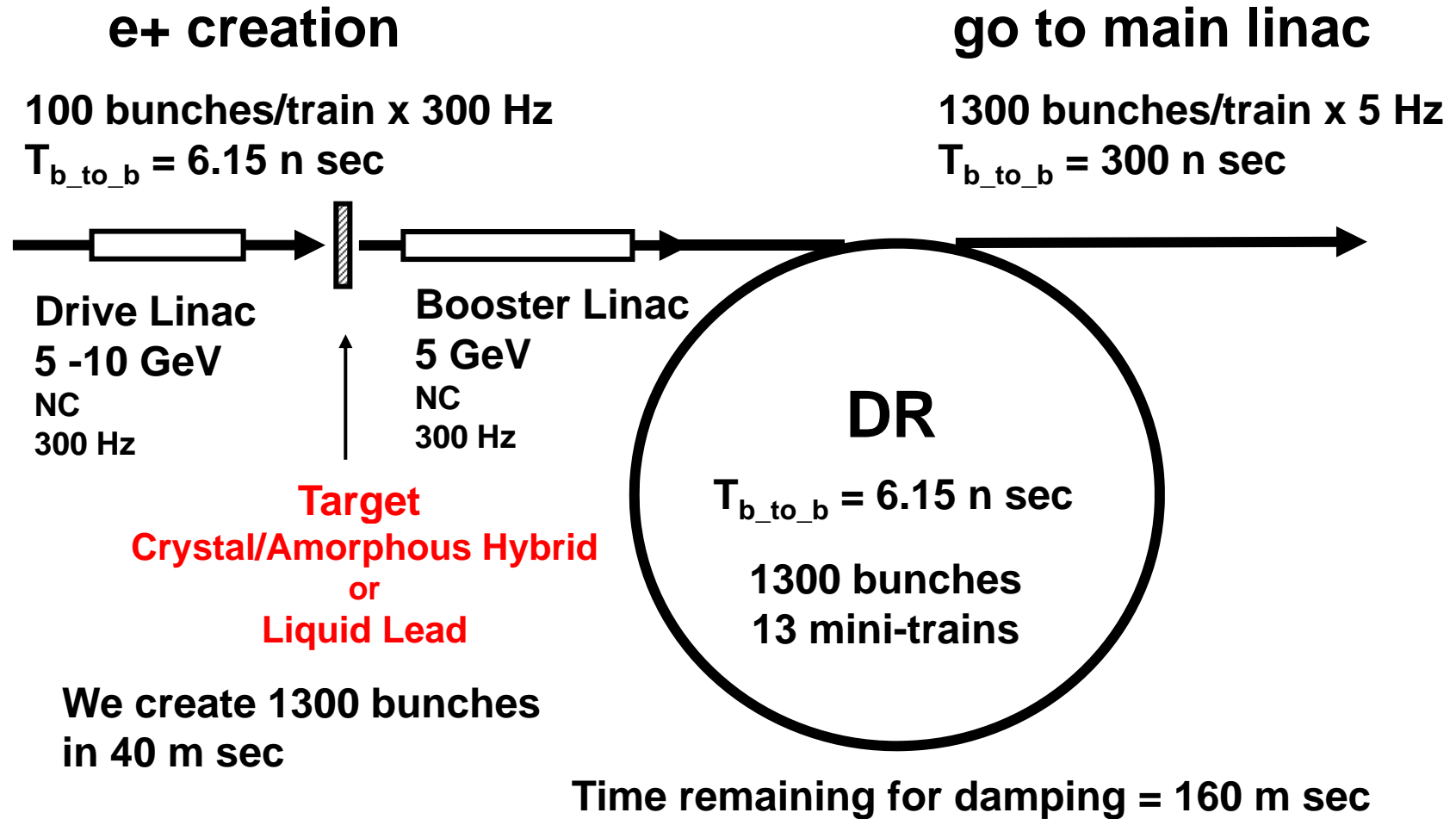
in view point of target thermal/shock issues

Need 2-3 targets ?

1 target --> Hybrid or Liquid-Lead target

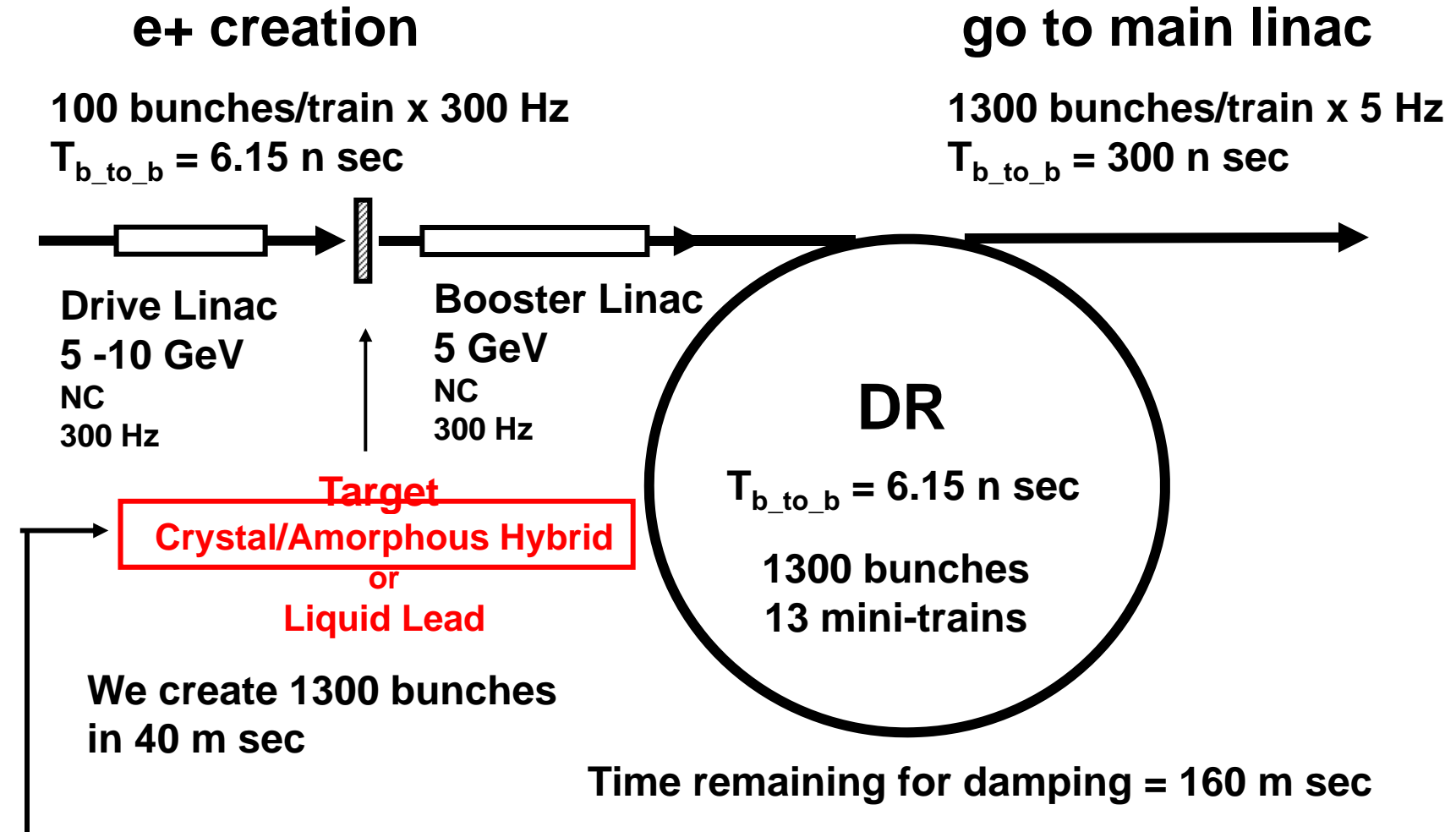
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300 Hz Advanced Conventional e⁺ Source for MM

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Normal Conducting Drive and Booster Linacs in 300 Hz operation



Chehab-san's talk

Summary

1. Conventional e^+ source is only e^+ source which we have experiences in real accelerators.
2. Independent.
3. But survivability is the issue.
4. Ease the survivability issue by 300 Hz gen.
make e^+ s in 40 m sec
5. Advanced Conventional e^+ Source (ACS)
Crystal/Amorphous Hybrid Target
Liquid Target
6. ACS + 300 Hz Generation
may be the most mature solution