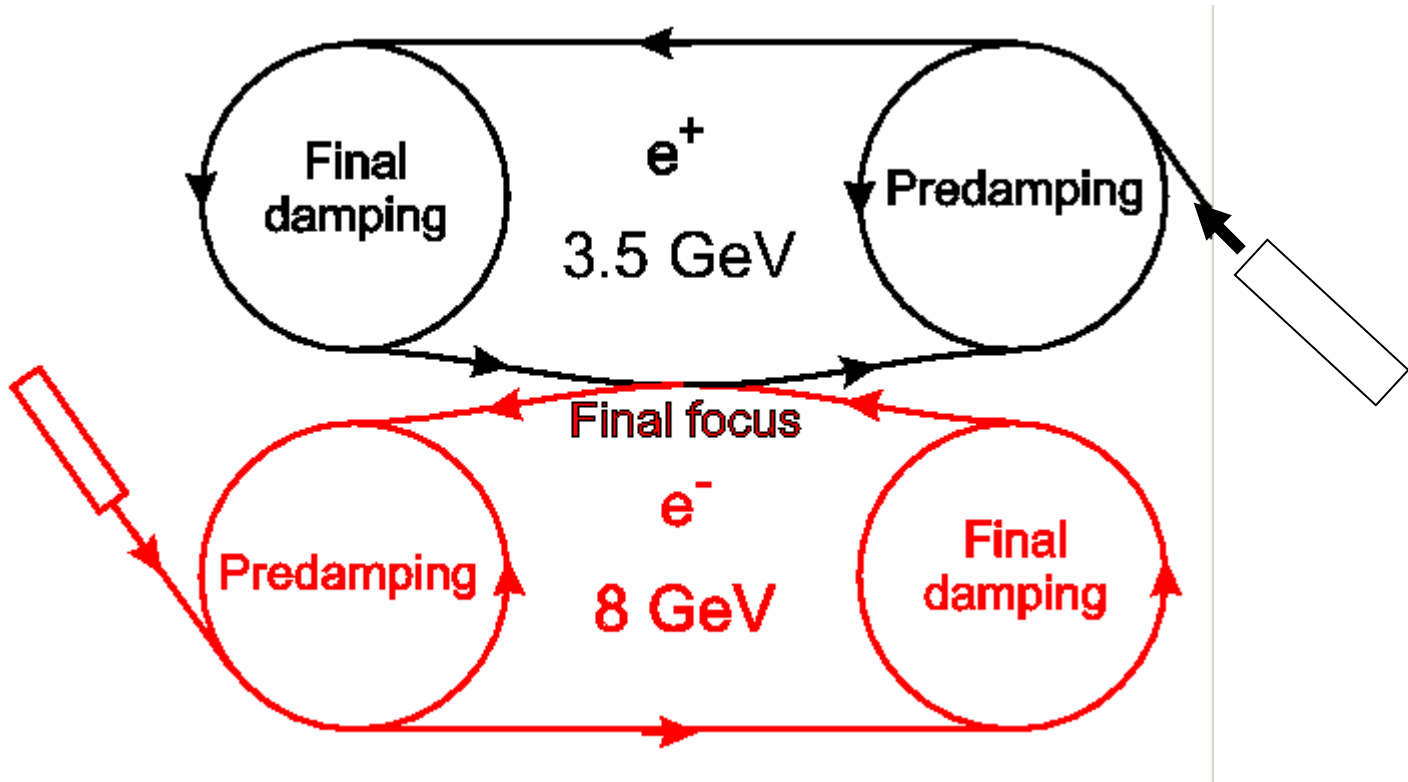




Optimization of SBF Damping Rings

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Frascati Meeting
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Overview of a SBF





SBF Option 1

- First damping ring small radius
 - ~200-500m
 - Several rings per particle type (~4)
- Second damping ring large radius
 - 2000-6000 m
 - One per beam
 - Damp slowly but to small emittance
 - Many bunches



SBF Option 2

- Only large diameter damping rings
 - ~2000-10000 m circumferences
 - Several rings per particle types (~2)
 - Many low charge bunches
 - Perhaps higher frequency RF (476-1400 MHz)



SBF Option 3

- Use damping ring for higher 7 GeV positrons, trickle charge and high charge per bunch. Use electron linac for low energy beam using SC cavities and throw beams away. Low energy-charge linac.
- Or reverse: damping ring for low energy beam e^+ and use e^- high energy linac. High energy e^- saves power ($\sim E^4$) in damping ring.



Personal Choice November 11, 2005

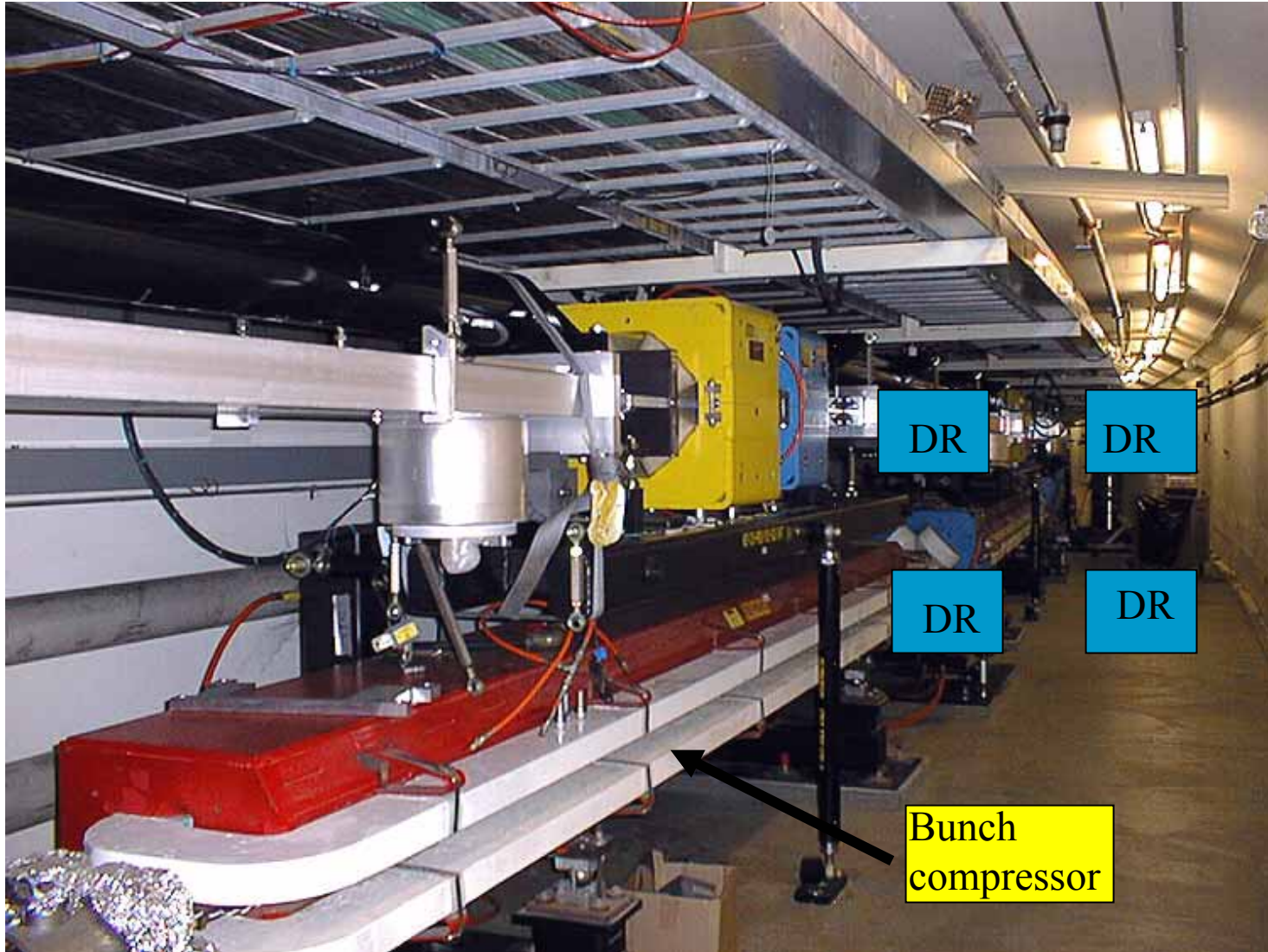
- Energies: 4 x 7 GeV
- Damping rings: two 2200 rings per beam
 - One fast damper and one slow damper
 - Use 476 MHz
- Use PEP-II HER as bunch compressors
- $\beta^* = 0.8$ mm
- Emittances = 0.25-0.5 nm (like PETRA-III)
- Round beams to gain Hd luminosity gain of $\sim x4$.
- 10 A per ring for 7000 bunches
- Collide each bunch at 120 Hz which is ~ 1 μ sec between collisions.
- Needs ~ 1 MHz kickers



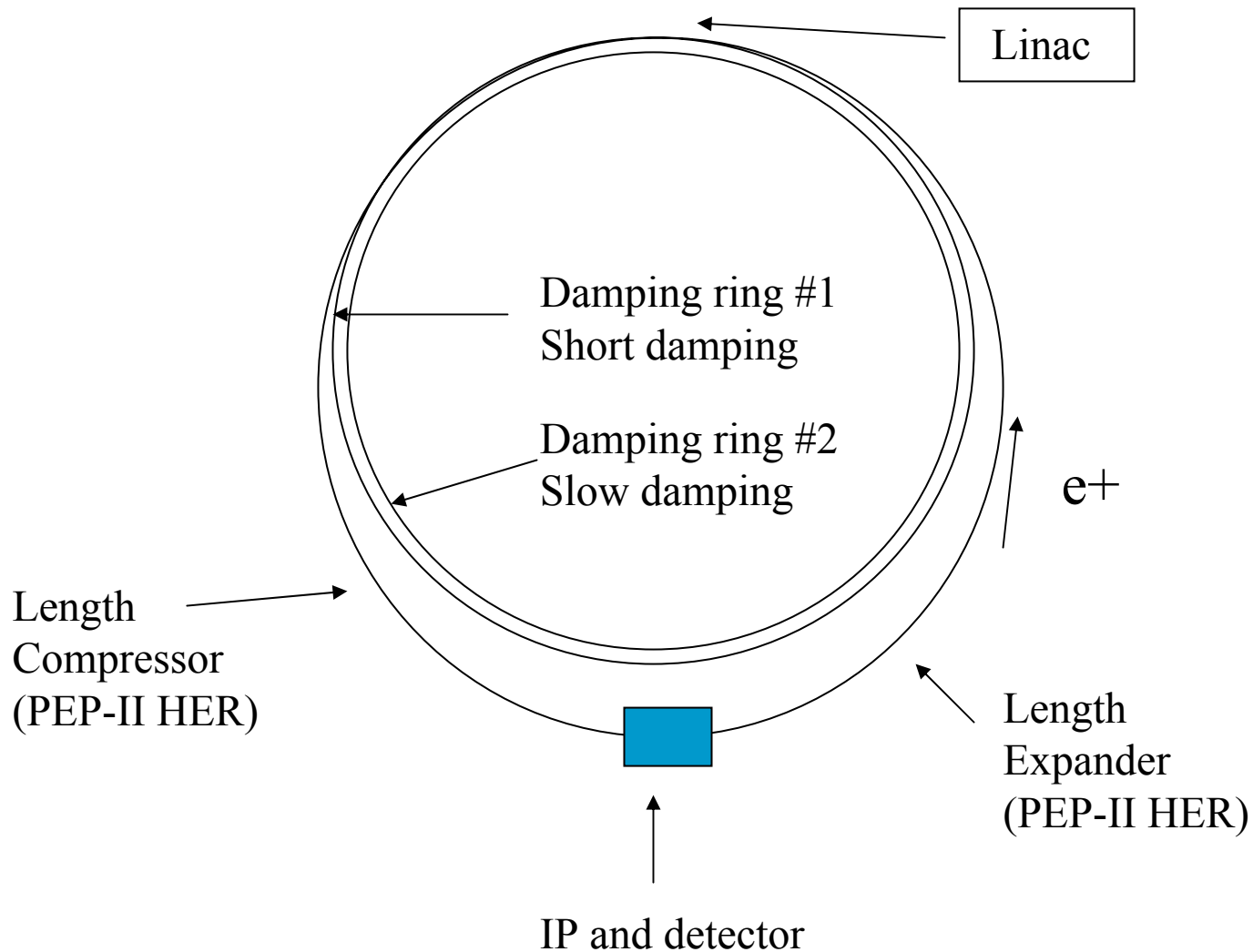
Full parameters

		LER	HER	
• Luminosity (L)	1.04E+36	***	***	1/cm ² /s
• CM energy	10.583	***	***	GeV
• Beam energy (E)	***	4	7	GeV
• Beam Gamma		7828	13699	
• Particle type		e-	e+	
• Crossing angle	0.000	***	***	mrاد
• Bunch collision frequency f	120	***	***	1/sec
• Disruption X	***	84.35	53.02	
• Disruption Y	***	119.29	74.98	
• Hd	4	***	***	
• Number bunches n	7000	***	***	
• IP betax*	***	0.8	0.8	mm
• IP betay*	***	0.8	0.8	mm
• IP emittance x (input)	***	0.5	0.5	nm-rad
• IP emittance y (input)	***	0.25	0.25	nm-rad
• IP bunch length gaussian	***	0.8	0.8	mm
• IP x beam size	***	0.632	0.632	microns
• IP y beam size	***	0.447	0.447	microns
• Beam rel. E spread (input)	***	1.00E-03	1.00E-03	fraction
• Number particles/bun N	***	1.10E+11	1.00E+11	

“SBF” Tunnel?



Overview schematic (One half)





What is the best?

- Many options to consider.
- Hope this workshop will provide a guide.