



SBF Synergy with a Linear Collider

John Seeman
SLAC
Frascati Meeting
November 12, 2005



Topics

- 1) Damping Rings
- 2) Interaction Region
- 3) Feedback Systems
- 4) Specific for a SBF

Many thanks to M. Biagini, P. Raimondi, M. Sullivan,
U. Wienands, D. Hitlin, K. Oide, ...



Common Issues: Damping Rings

- Energy of damping rings for LC and SBF are about the same
- Transverse damping times are about the same
 - Energy spread for SBF smaller
- Required dynamic apertures are similar
- Most beam dynamics will be only multi-bunch effects
- Very low emittances both x and y are needed
- RF frequencies in the range of 450 to 1500 MHz
- Electron cloud effects will play a part



Common Issues: Interaction Region

- Very small IP beta functions
 - \rightarrow big betas in IR quads
- Very small beam sizes
- Flat beams more likely
- Both can use permanent magnets or SC IR quads



Common Issues: Feedback issues

- Bunch-by-bunch feedbacks needed (few nsec)
- High transient-response needed (injection-extraction)
- Beam emittance ranges are large (100 nm input to 0.02 nm output)
- Collision feedbacks need to work on multi-bunch time scales



Specific to a SBF

- Asymmetric beam energies
- Very low energy spread needed at IR
- Bunch length compression just before IR
- Head-on collisions (?)
- Very large disruption parameters (~ 100 to 500)
- No pair creation problem at IP
- Beam collimation should be much easier
- Bunch collision rate is ~ 100 kHz vs < 5 kHz
- Physics event rate ~ 10 KHz vs 0.01 Hz for LC
- Average beam current in IP much higher than LC
- Bunch charge recovery