#### ILC Single Stage Bunch Compressor

Based on the work by A. Wolski and P. Tenenbaum (coupler's simulations by A. Latina)

#### Description

Compression using one wigger, Raubenheimer type, with a single bend magnet between quads in a FODO lattice.

Dispersion is zero at the quads, the eta' is not zero at the quads (as opposed to a true chicane between quads, which zeros all dispersions to all orders).

There's a dispersion match, a dispersion suppressor, and 6 FODO cells with bending magnets.

This is somewhat longer than the minimal system, which would have 3 FODO cells (thus allowing normal/skew quads for dispersion control, set in -I pairs in both phases).

#### **Twiss Parameters**



### Twiss Parameters of the BC Wiggler



#### Properties

The properties of the bunch compressor are: Voltage: 1275.2 MV @ 1.3 GHz
Phase: -119.5 degrees
Energy Loss: 627.9 MeV
R\_56: -147.5 mm
Desired final bunch length: 0.3 mm.

The beam properties at injection are: Charge: 2e10 (3.2 nC)
Energy: 5 GeV
Energy spread: 0.15%
Bunch Length: 6 mm

• The beam properties at injection are: Total length: 460 m

#### Longitudinal Phase Space after BC



#### Longitudinal Phase Space after Linac



## Emittance along the beamline for an on-axis beam



# Emittance growth for a 1 sigma offset (BC+Linac)



### Emittance growth due to Coupler's RF-Kick and Wakefields (BC)

- RFKick + Wakefields are considered
- Compression stage and accelerating stage are considered independently
- Accelerating stage is taken from BC2 (second stage of compression)



Accelerating Stage from 5 to 15 GeV (BC2)