

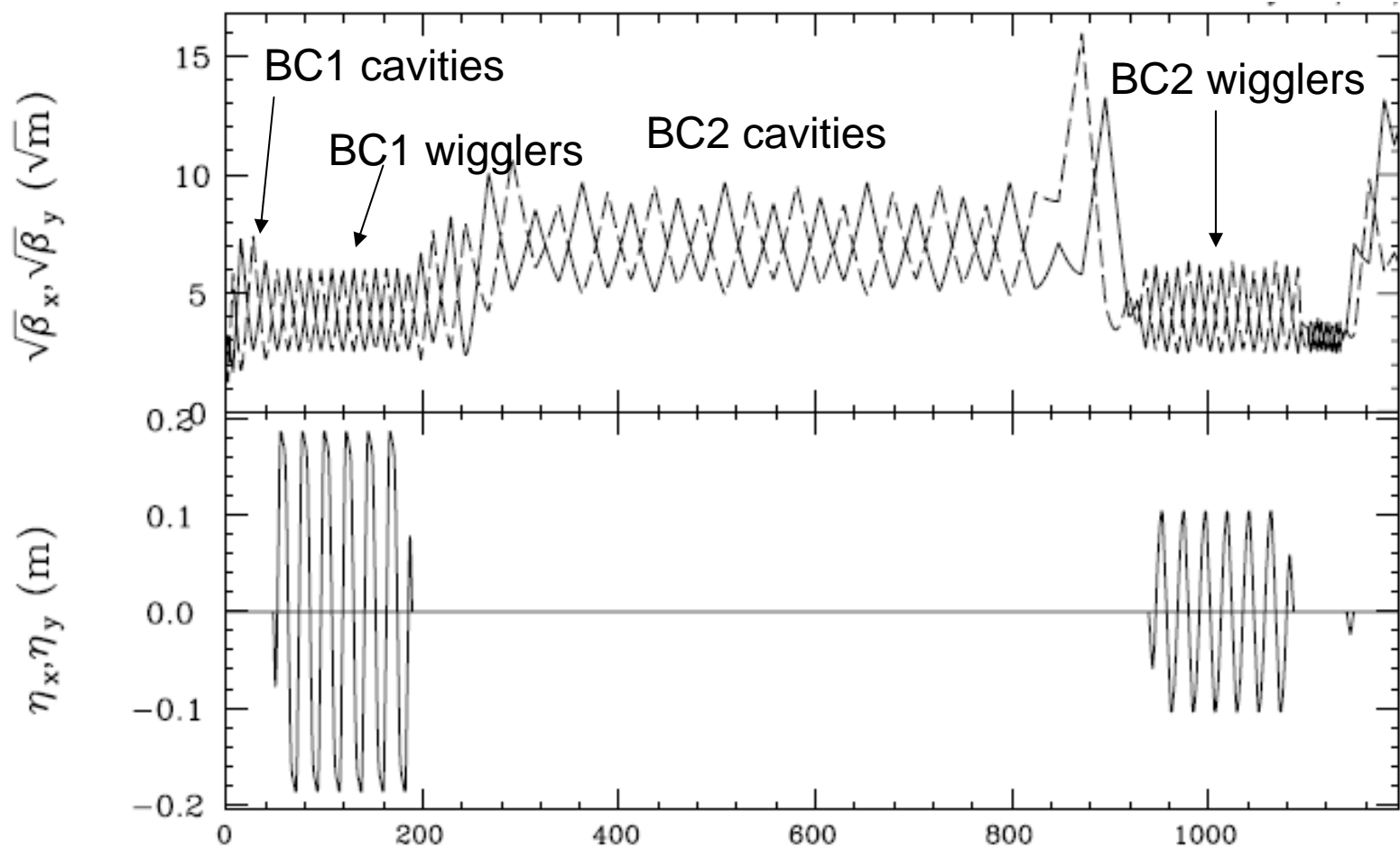
# DFS simulation in Bunch Compressors of ILC

--- first trial ---

K.Kubo (KEK)

2007 ILCWS, DESY

ILC Bunch Compressor, calc. by SAD,  
xsif -> SAD Translated by S.Pei (IHEP)



All simulations used SAD. Tracking of macro-particles.

# DFS in Bunch Compressors

Minimize Orbit difference of different RF phase settings of BC1 and BC2 (z can be vertical and horizontal)

- i-th BPM reading for nominal setting:  $z_{i0}$
- i-th BPM reading for different phase:  $z_i$
- Using steering magnets, minimize  
$$\sum_i \{ w^2 (z_i - z_{i0})^2 + z_{i0}^2 \}$$

w: weight factor,  $\sim$ BPM misalignment/BPM resolution

In this study:

- Same phase change for all cavities in BC1 and BC2
- All BPMs and all steering magnets were used.

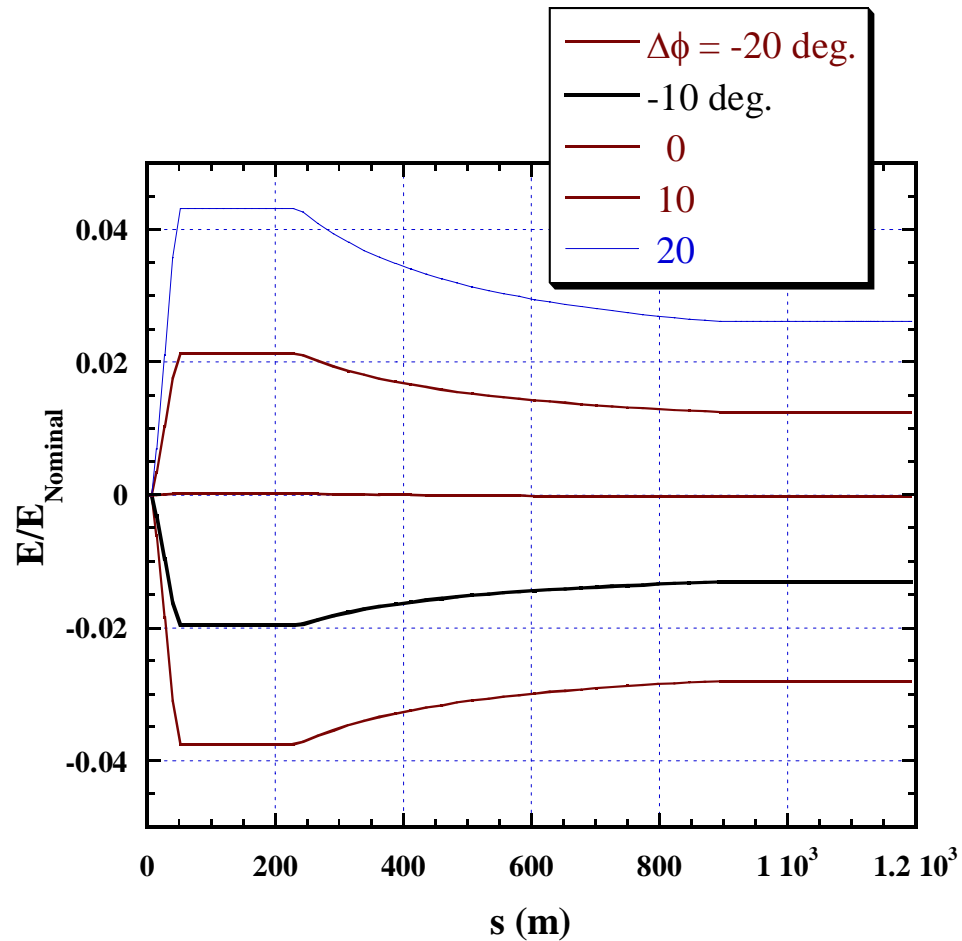
# Errors (RMS)

- Quad and Bend offset: 150 micron
- BPM offset w.r.t. quad: 7 micron (not important)
- BPM resolution: 0.5 micron (or 1.0 micron)
- Cavity offset: 300 micron
- Cavity tilt: 150 micro rad. (effectively 300 micro rad.)

## NOTE:

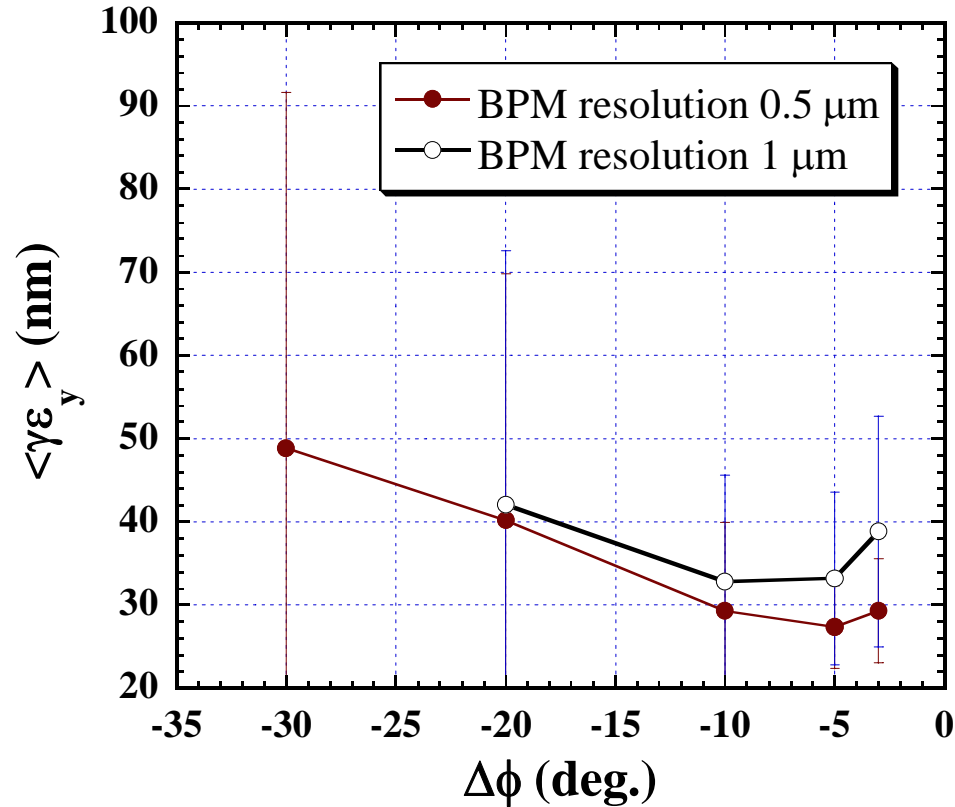
- Edge (de)focus cancel approximately a half of the vertical kick due to cavity tilt.
- Edge focus of accelerating cavities are not readily included in the simulation code SAD.
- The effect should be included in SAD, hopefully sometime soon.

# Energy deviation from nominal with RF phase shift



# Final Emittance vs. phase shift

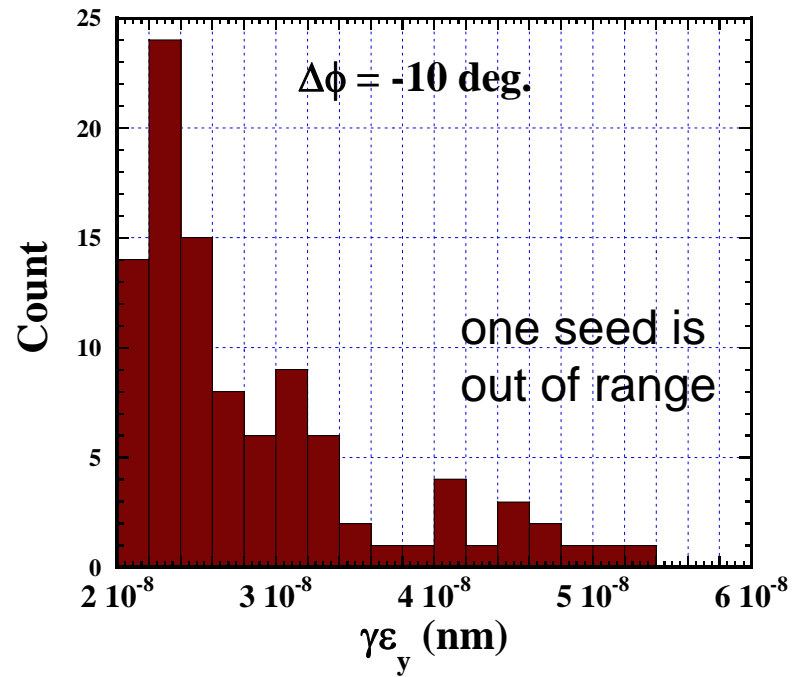
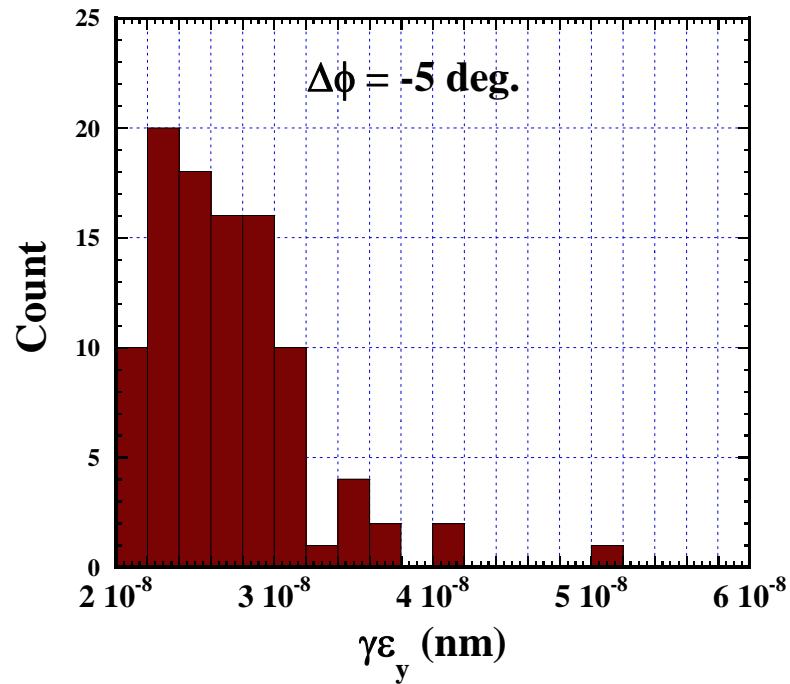
Average of 100 seeds and standard deviation



It has not been understood yet why larger phase change give worse result.

# Distribution of final emittance

(100 seeds)



# SUMMARY

- Dispersion Free Steering was tested for Bunch Compressors of ILC
- Results are not satisfactory, but suggest;
- It is worth to perform further study.
  - understand why larger phase change give worse result
  - Survey parameters (phase shift etc.)
  - Include more realistic errors
  - etc.