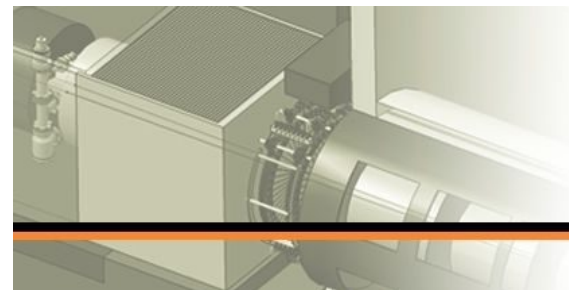


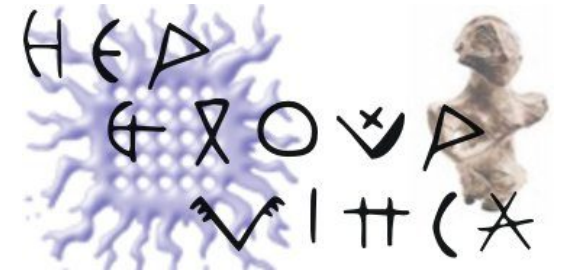
# BHSE at ILC

S. Lukić - HEP Group Vinča  
CERN meeting, November 2011



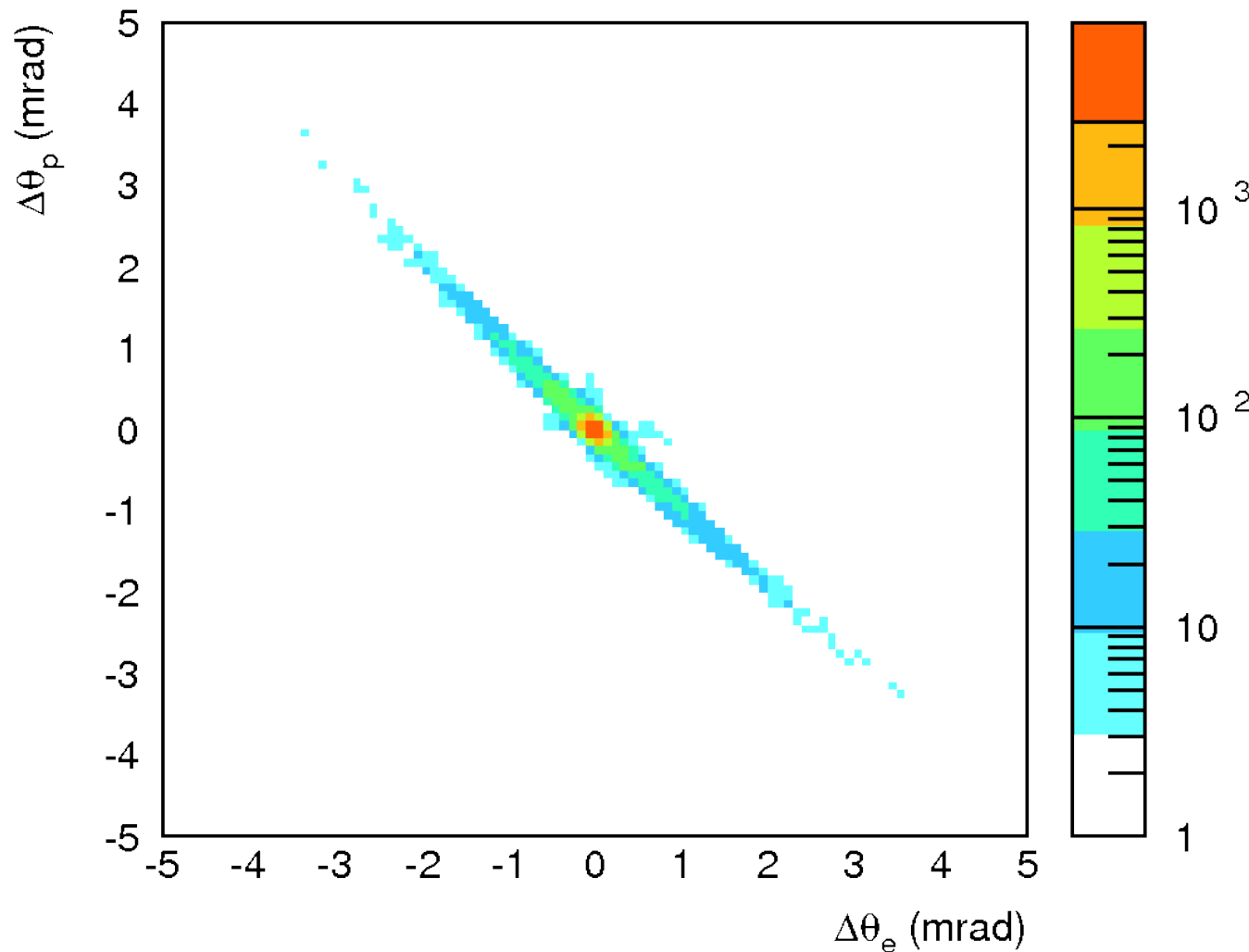
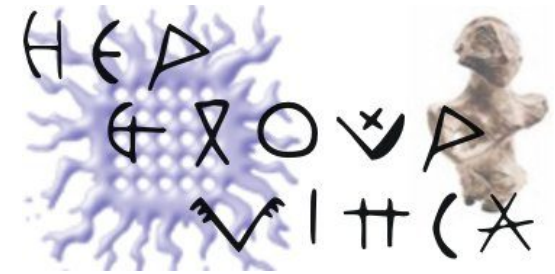
**FCM**  
Collaboration  
High precision design

# Summary



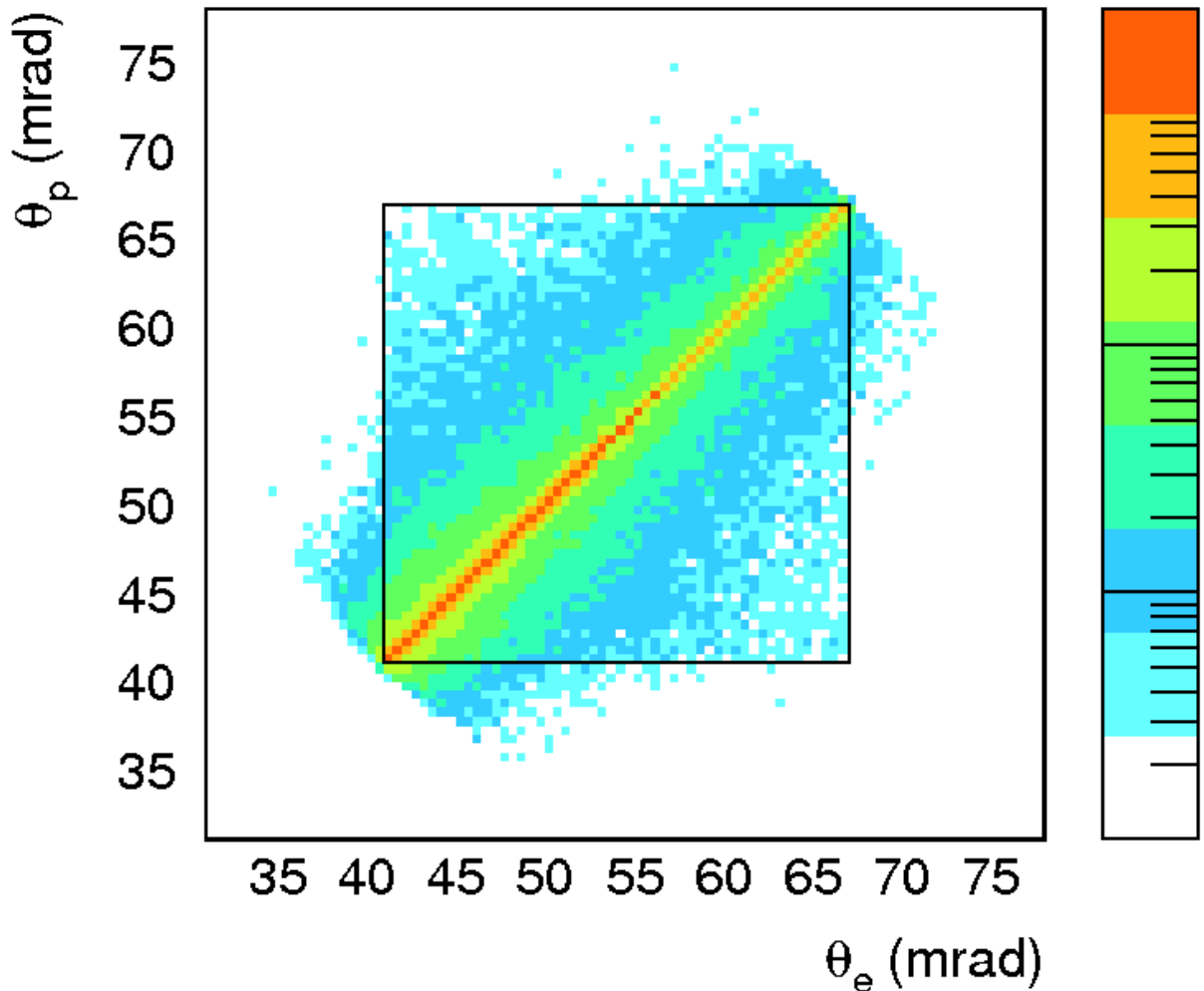
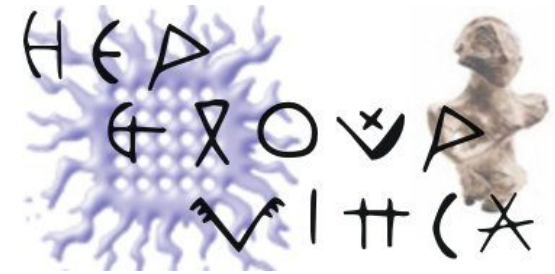
- Method of analysis
- New selection cuts that reduce the BHSE to zero @ILC

# Cuts optimization at ILC



- Anticorrelated shift in  $\theta_e, \theta_p$  due to the asymmetric energy loss in Beamstrahlung (CM gains impulse in z-direction)

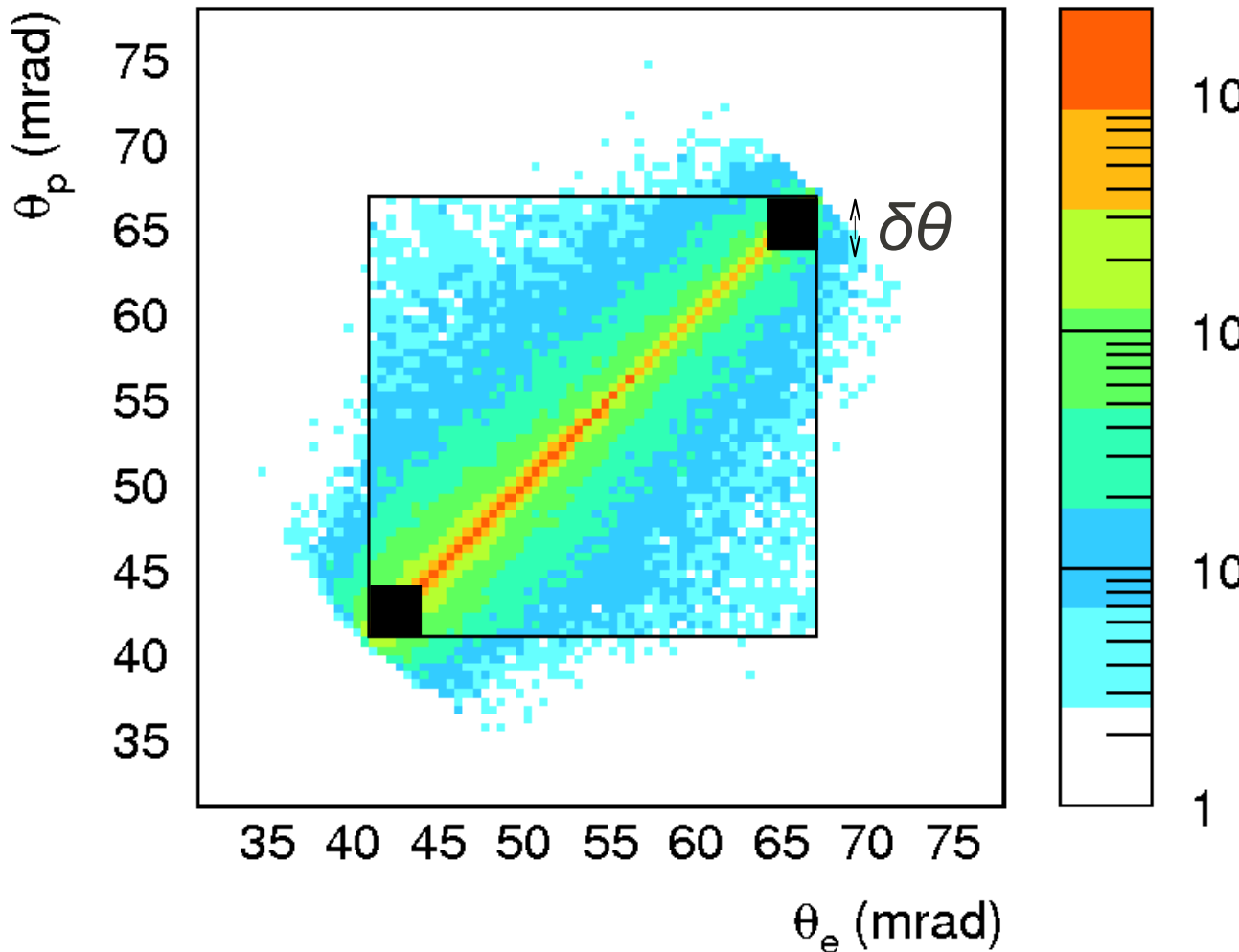
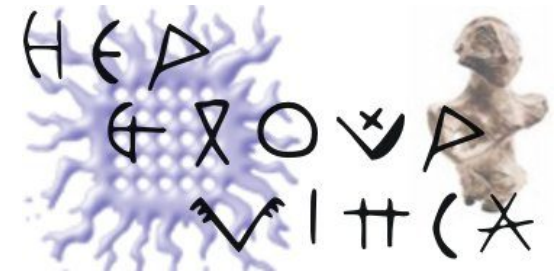
# Cuts optimization at ILC



Most Bhabha events that migrate outside of the fiducial volume start out near the edges.

$$\theta_e, \theta_p \approx \theta_{min}$$
$$\theta_e, \theta_p \approx \theta_{max}$$

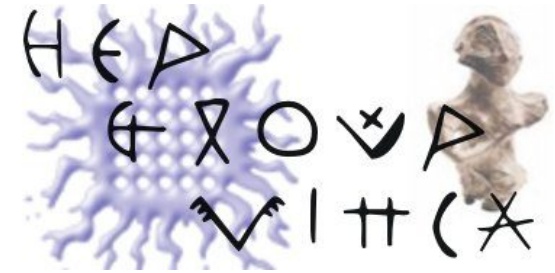
# Cuts optimization



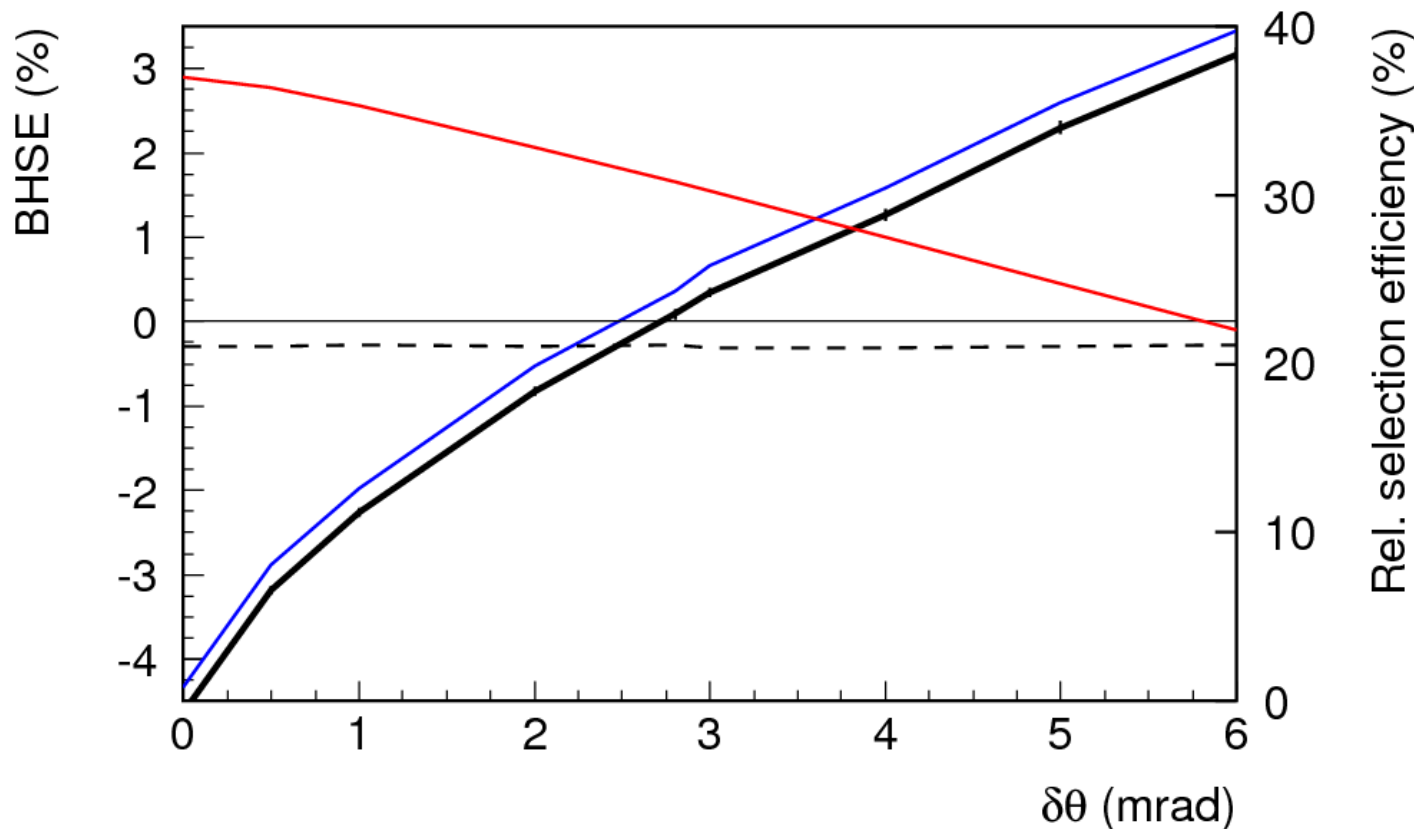
Recipe:

Remove the narrow regions “Both particles within  $\delta\theta$  from  $\theta_{min}, (\theta_{max})$ ” from the selection cuts.

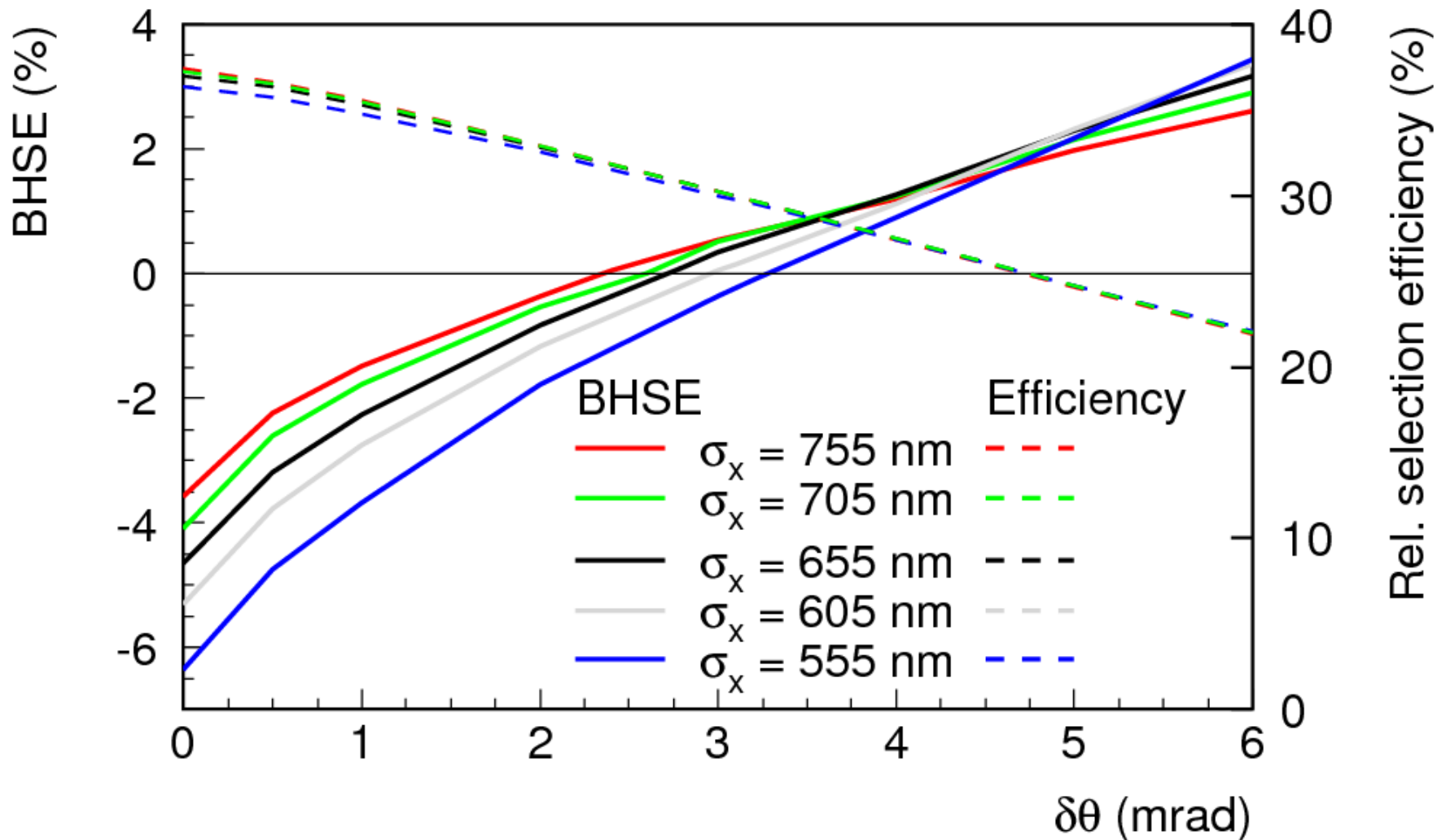
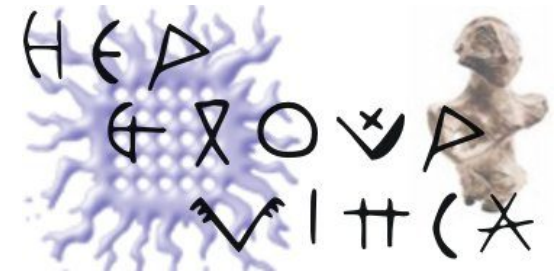
# $E_{rel}$ + “dented” FV



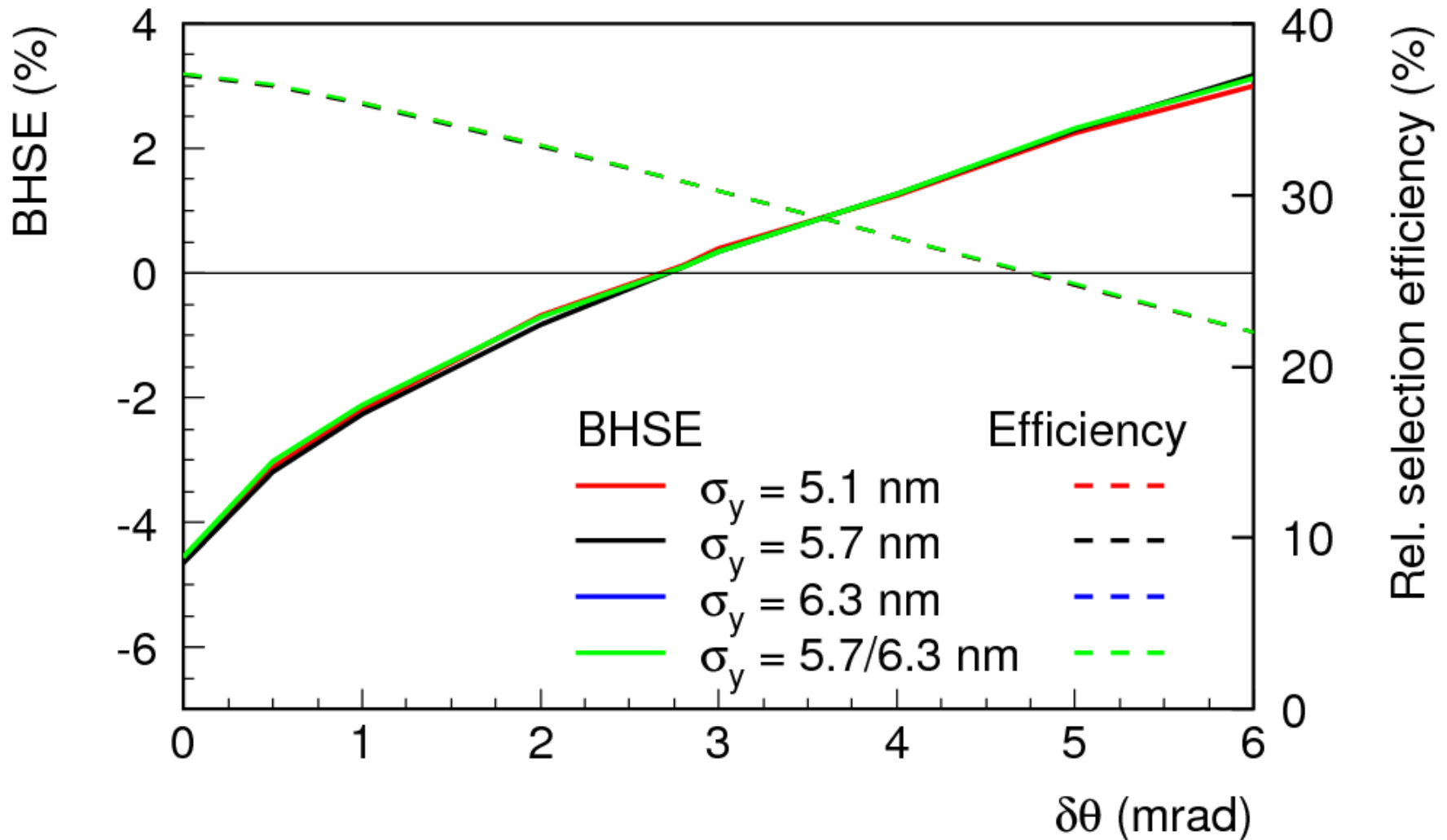
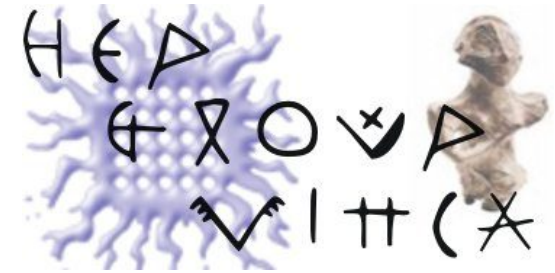
- Present LumiCal geometry (FV = [41,67] mrad)
- BHSE can be reduced to zero.  
For  $\delta\theta = 2.7$  mrad, total BHSE =  $(0.04 \pm 0.06) \%$
- Efficiency relative to the geom. acceptance [31,78] mrad



# Sensitivity to $\sigma_x$ and offset

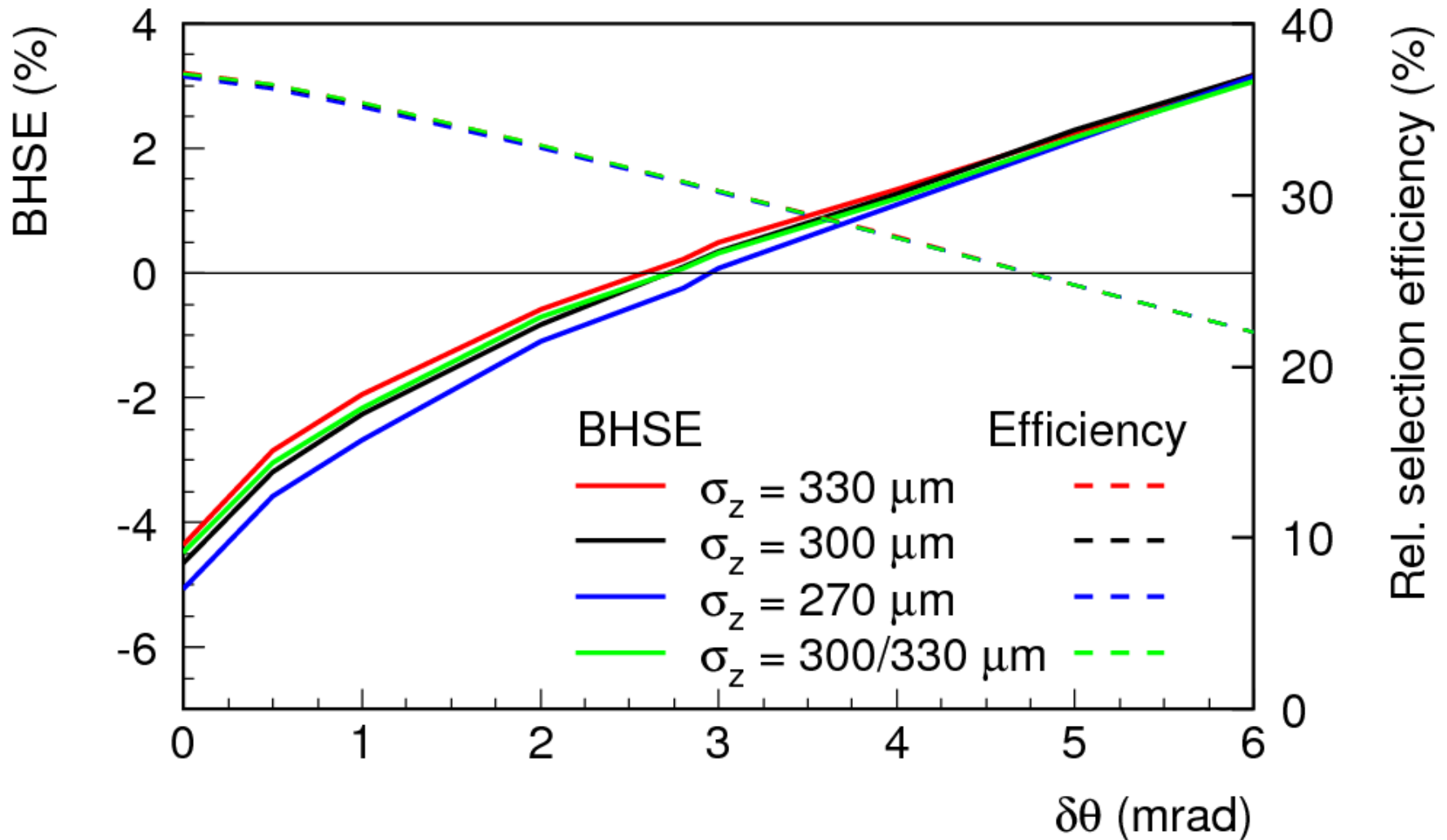
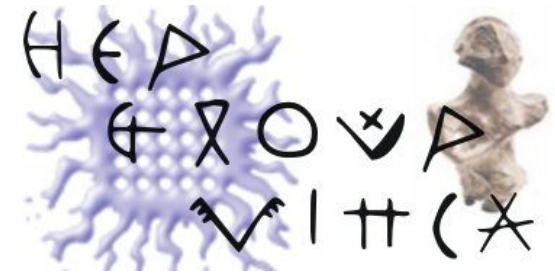


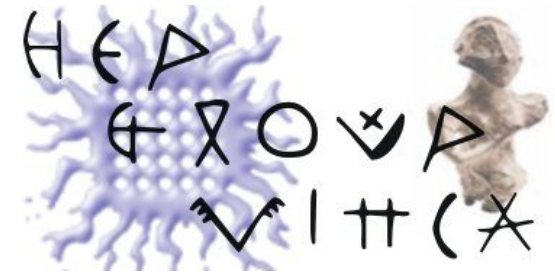
# Sensitivity to $\sigma_y$





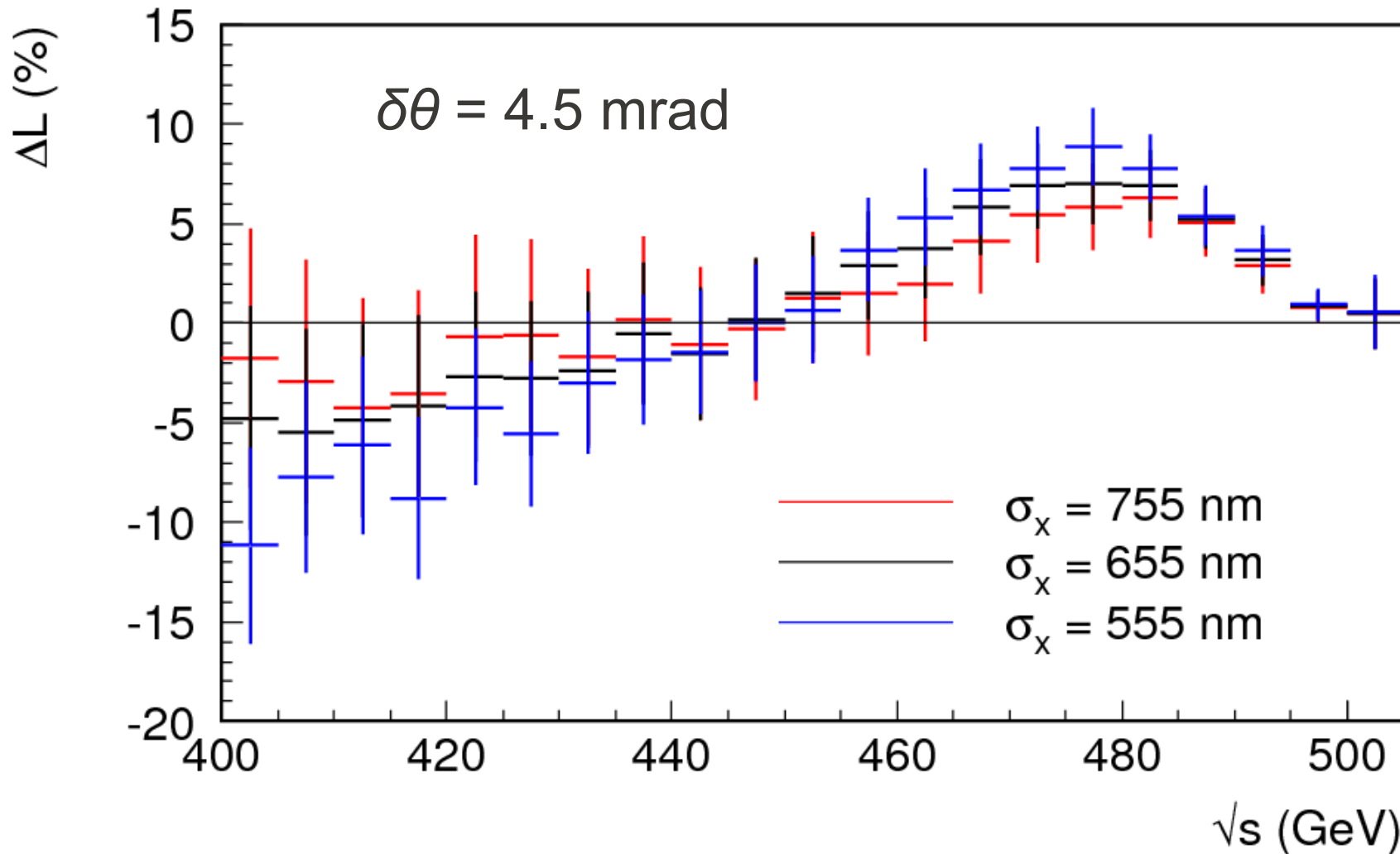
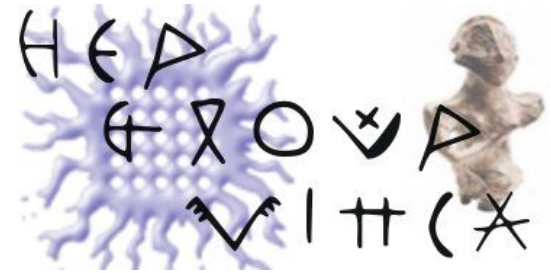
# Sensitivity to $\sigma_z$



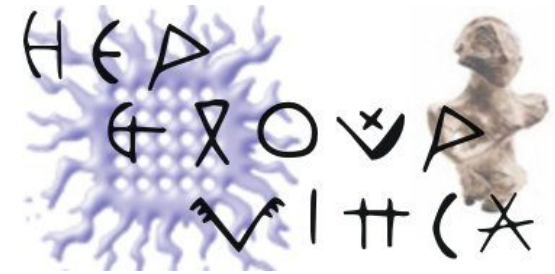


$\sigma_x$ (nm)	<i>BHSE</i> (%) $\delta\theta = 2.7$ mrad	<i>BHSE</i> (%) $\delta\theta = 4.5$ mrad	$\Delta$ <i>BHSE</i> (%) $\delta\theta = 4.5$ mrad
555	-0.883	1.453	-0.253
605	-0.380	1.628	-0.078
655	-0.031	1.706	0.000
705	0.095	1.655	-0.051
755	0.236	1.590	-0.116

# Distortion of the luminosity spectrum by the BHSE



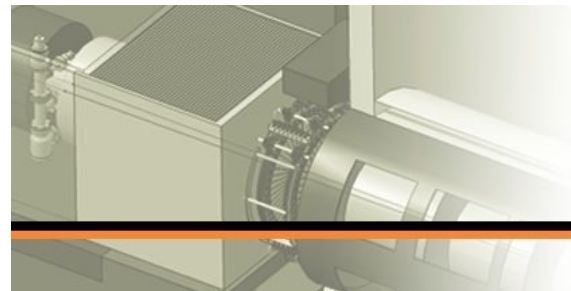
# Conclusions



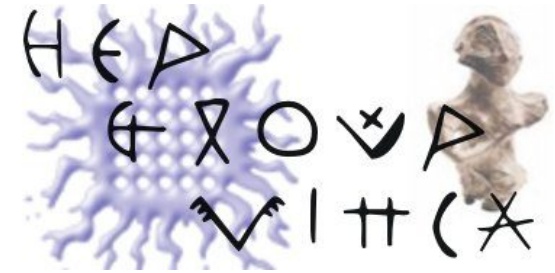
- BHSE can be eliminated at ILC using suitable selection algorithms. Alternatively, the sensitivity of BHSE to the beam shape can be minimized.
- Distortion of the Luminosity spectrum due to the beam-beam effects might be an issue



# Additional slides



# Comparison 500 GeV – 1 TeV



- $E_{sum}$  + “dented” selection cuts

