## ECLOUD benchmarking continued:

results for LHC quadrupoles and drifts

compare new version, May-2004 version, and new version with wrong  $\theta$  dependence

ECLOUD benchmarking – LHC drift,  $\delta_{max}$ =1.3, R=1.0 - heat load per bunch



ECLOUD benchmarking – LHC quadr.,  $\delta_{max}$ =1.3, R=1.0 - heat load per bunch



Frank Zimmermann, RLC Meeting 11.03.2005

# excerpt from my 2004 MAPS objectives:

"Estimate reduced lifetime from differences in bunch-to-bunch emittances in order to deduce specifications for LHC injectors."

Neither Francesco nor I could recall what was meant, but now I assume that this referred to the effect of head-on beam-beam interaction with unequal beam size.

#### HERA data (Brinkmann, Willeke, PAC1993)

### p tune shift $ξ_p = 0.0004$ -7 (per IP) $ξ_p = 0.0008$ -14 (total)



HERA data (Brinkmann, Willeke, PAC93, also Limberg LHC99)

*p* tune shift  $\xi_p = 0.0004$ -7 (per IP),  $\xi_p = 0.0008$ -14 (total)



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SPS data (Cornelis, Meddahi, Schmidt, EPAC 1990)



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#### RHIC data (Fischer 2005)

early in 2005, RHIC lifetime was measured for beams of different emittance; effect was visible when emittances differ by more than 50%; RHIC emittance measurement is not accurate to a few percent

Wolfram will send us detailed results when analysed

