PETRA III Vacuum chamber

Arc: **AI**, 80 mm x 40 mm





Wiggler: AI, 96 mm x 17.9 mm NEG coated





Undulator: AI, 57 mm x 7 mm

Rainer Wanzenberg | PETRA III | Oct., 2010 | Page 6



Vertical emittance blow up (640 bunches)



Studies with wigglers – Aug 17 and Sep 15, 2010

60 x 4 bunches



No emittance blow-up



80 x 4 bunches



Emittance growth 50 mA ... 75 mA and "upper sidebands"



$\frac{1}{2}$ 80 x 4 bunches



Emittance growth and build-up of "upper sidebands"



Filling pattern N x 4, 16 ns bunch spacing



200 bunches + witness bunch, upper sidesbands have been observed:

May/June with wigglers, for a witness bunch about 72 ns behind the bunch train bunch pos #409 (2nd fill) #411 (1st fill) (96 ns behind the bunch train)

Aug 5, (w/o wigglers) 56 ns behind the bunch train (bunch pos #407) Aug 17 with wigglers 56 ns behind the bunch train (bunch pos #407)

Rainer Wanzenberg | PETRA III | Oct., 2010 | Page 14

Simulations: 60 x 4 and 80 x 4 bunches

Simulation with ECLOUD 4.0: PETRA III, I = 50 mA N = 1.0 10^{10} and 0.75 10^{10} , bunch spacing 16 ns

2e+013 2.5e+009 P3 60x4 60 x 4 P3 80x4 80 x 4 2e+009 1.5e+012 **SEY 2.5** 1.5e+009 center density 1e+012 -lectron ~ 1.0 10¹² m⁻³ 1e+009 5e+011 5e+008 center density is similar in both 1e-007 2e-007 3e-007 4e-007 5e-007 6e-007 7e-007 8e-007 9e-007 1e-006 1e-007 2e-007 3e-007 4e-007 5e-007 6e-007 7e-007 8e-007 9e-007 1e-006 0 Time / sec Time / sec cases 1e+012 60 x 4 P3 60x4 1.4e+009 80 x 4 P3 80x4 1.2e+009 8e+011 **SEY 2.0** 1e+009 6e+011 ron cloud center density 8e+008 ~ 0.5 10¹² m⁻³ 4e+011 6e+008 4e+008 2e+011 2e+008 0 1e-007 2e-007 3e-007 4e-007 6e-007 7e-007 8e-007 9e-007 1e-007 2e-007 3e-007 4e-007 5e-007 5e-007 1e-006 0 6e-007 7e-007 8e-007 9e-007 1e-006 Time / sec Time / sec

Red 60 x 4 bunches Blue 80 x 4 bunches,

Rainer Wanzenberg | PETRA III | Oct., 2010 | Page 20

