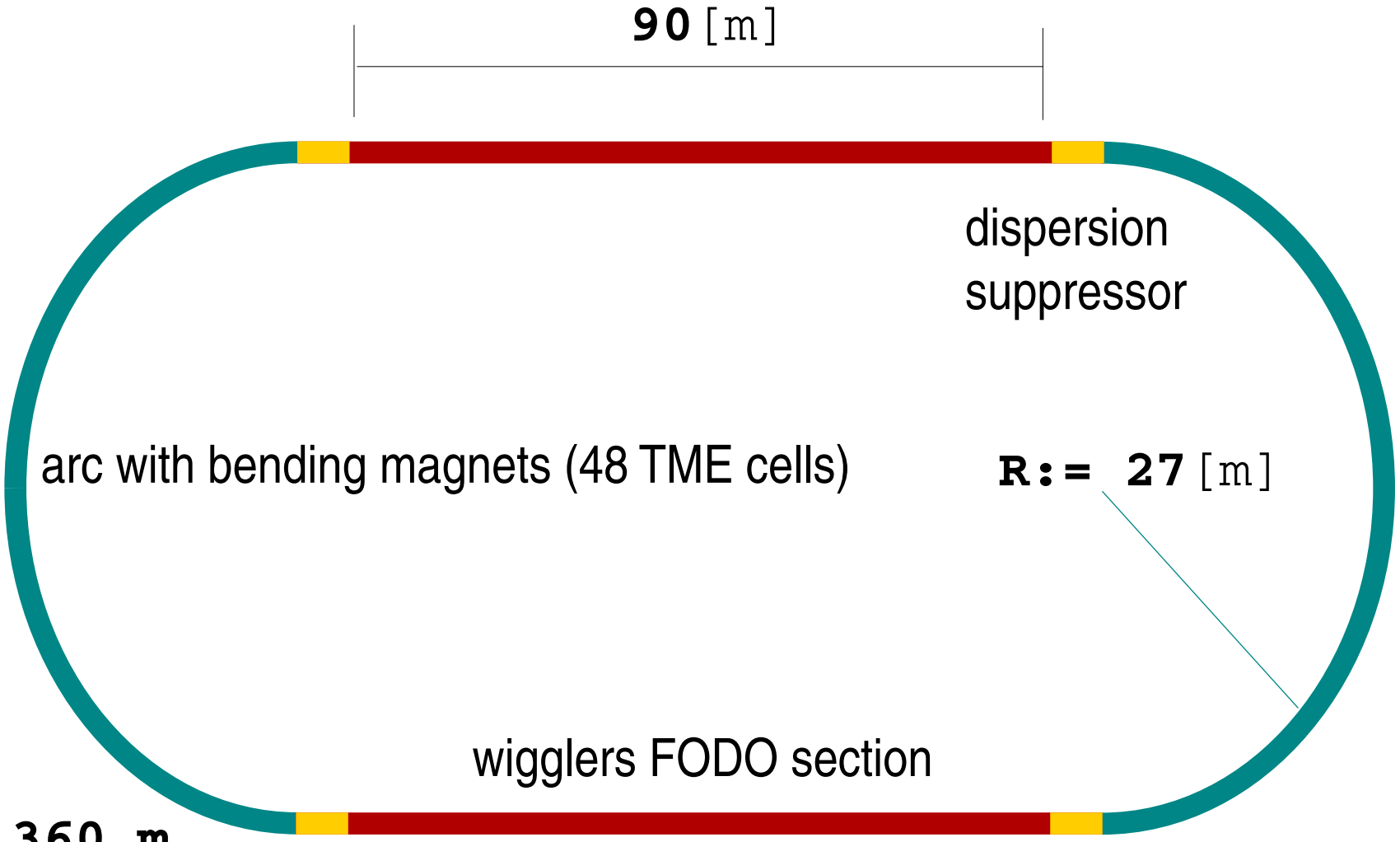
layout of the CLIC positron damping ring



C:= 360 m

E:= 2.424 GeV

76 wigglers in the ring
length of each wiggler is 2m

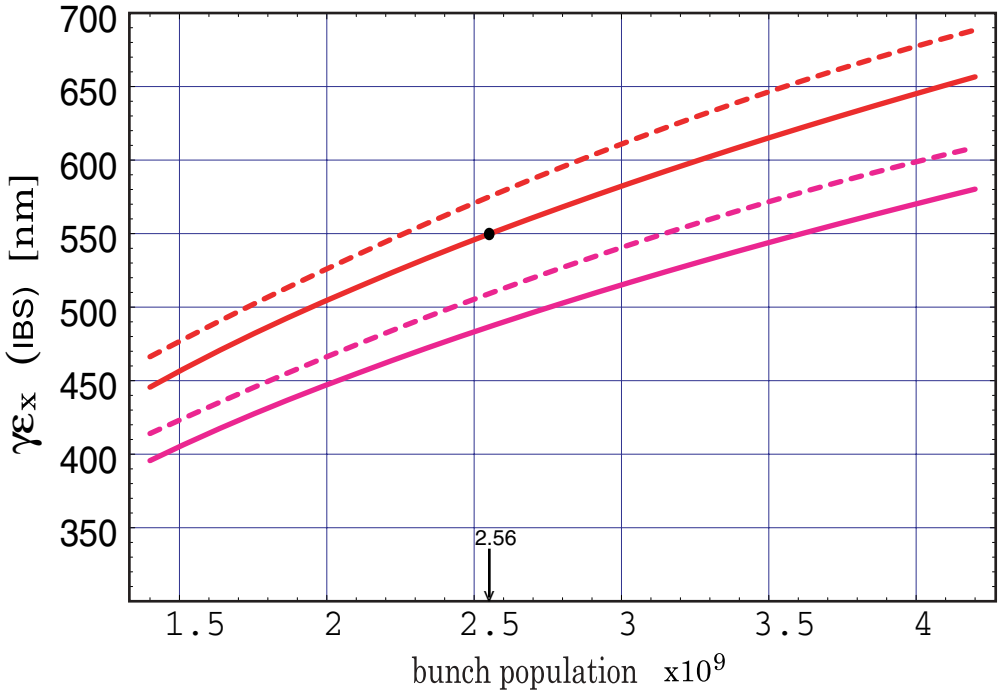
Transverse normalized emittances in CLIC_DR with wiggler period of 10 cm
Energy is 2.424 GeV, wiggler field 1.7 T

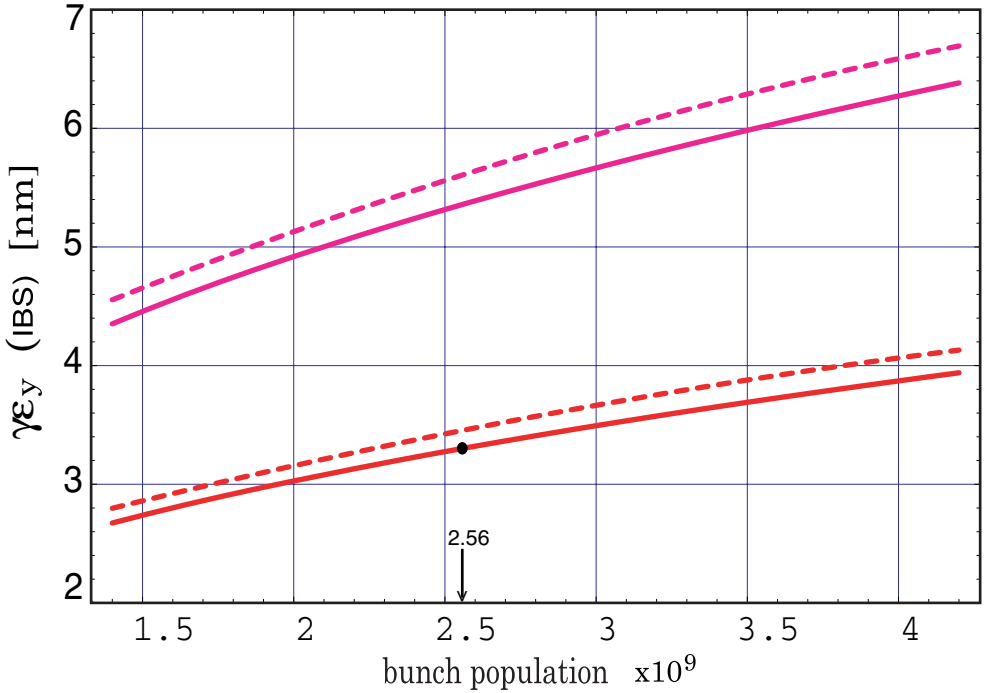
V_{rf} —— 2.39 MV

V_{rf} ····· 2.59 MV

betatron coupling 0.6 %

betatron coupling 1.1 %





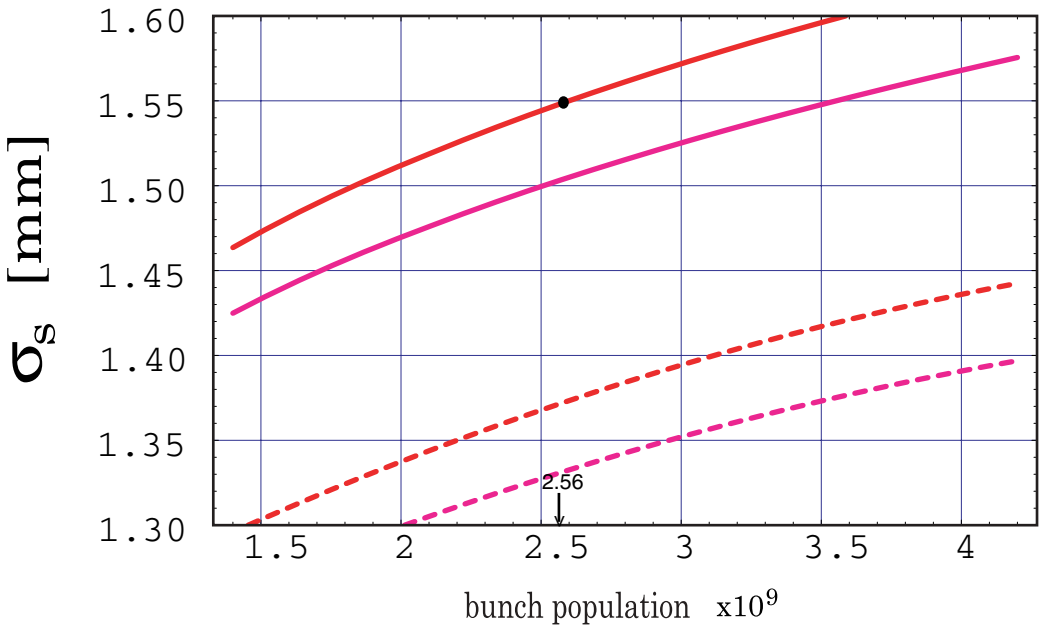
rms bunch length, rms energy spread, longitudinal normalized emittances in CLIC_DR with wiggler period of 10 cm, E=2.424 GeV, wiggler field 1.7 T

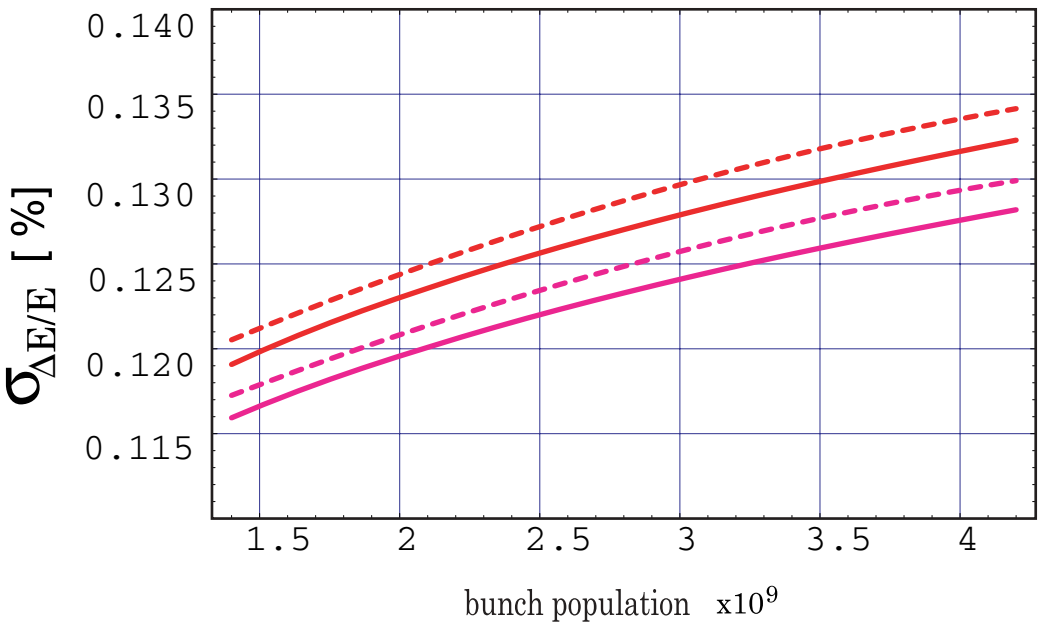
V_{rf} —— 2.39 MV

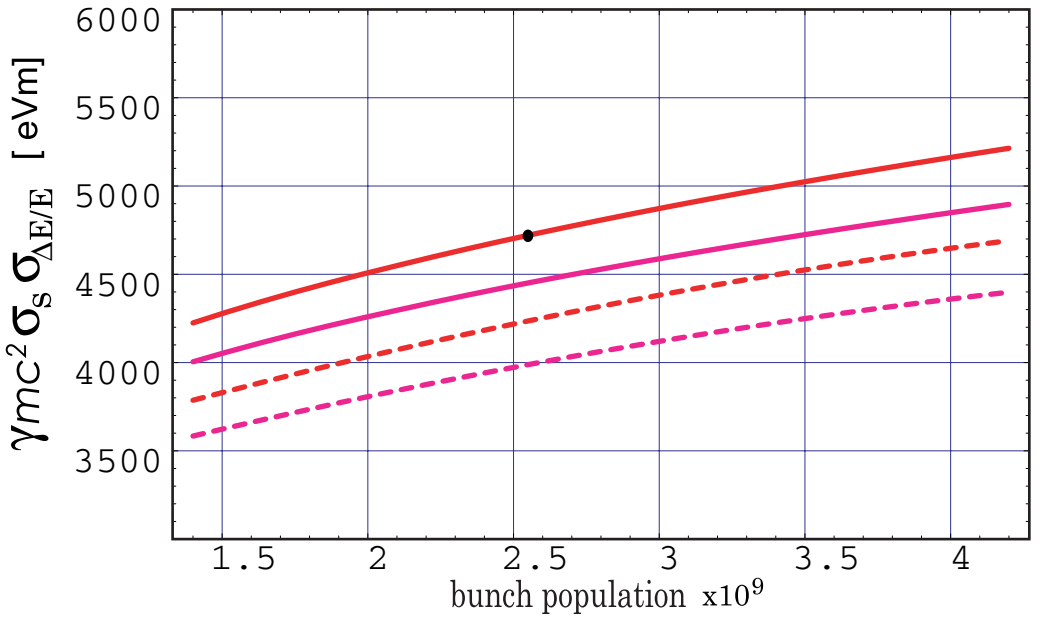
V_{rf} ····· 2.59 MV

betatron coupling 0.6 %

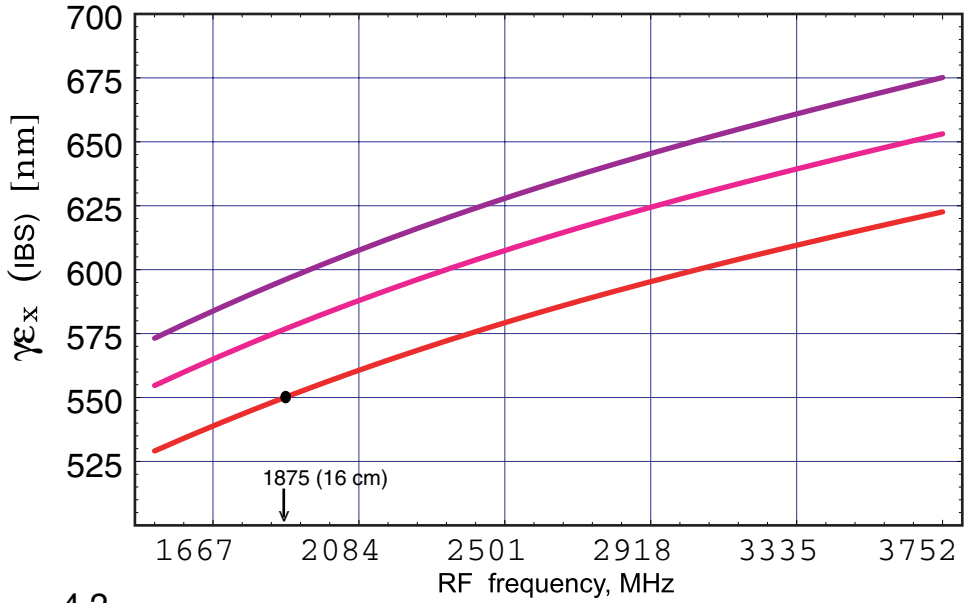
betatron coupling 1.1 %

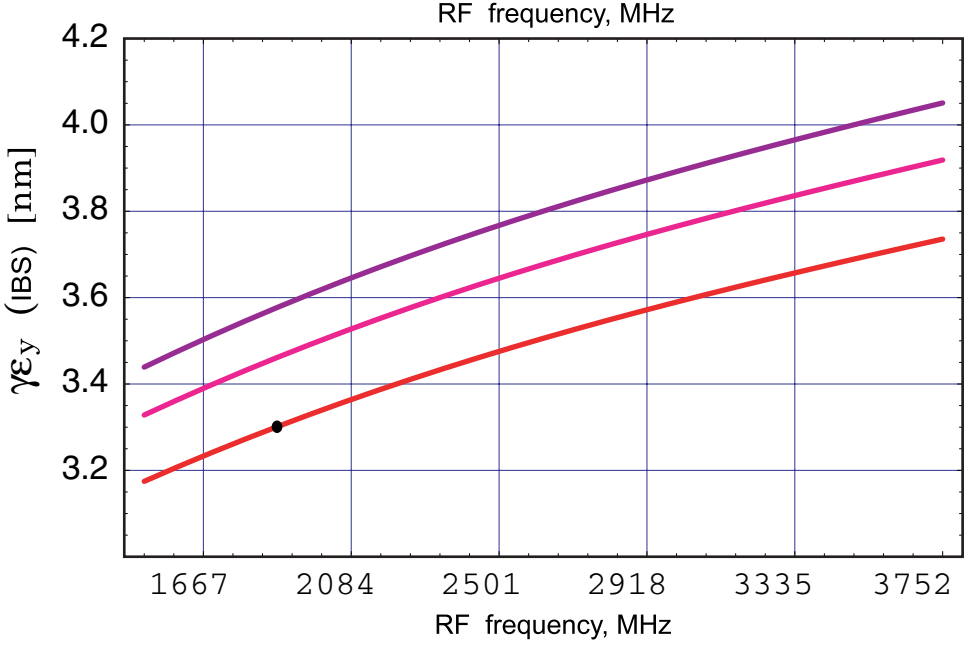






Emittances dependence on RF frequency (bunch spacing is equal to RF wave length) at betatron coupling 0.6 %, bunch population 2.56 x 10^9, wiggler field 1.7 T



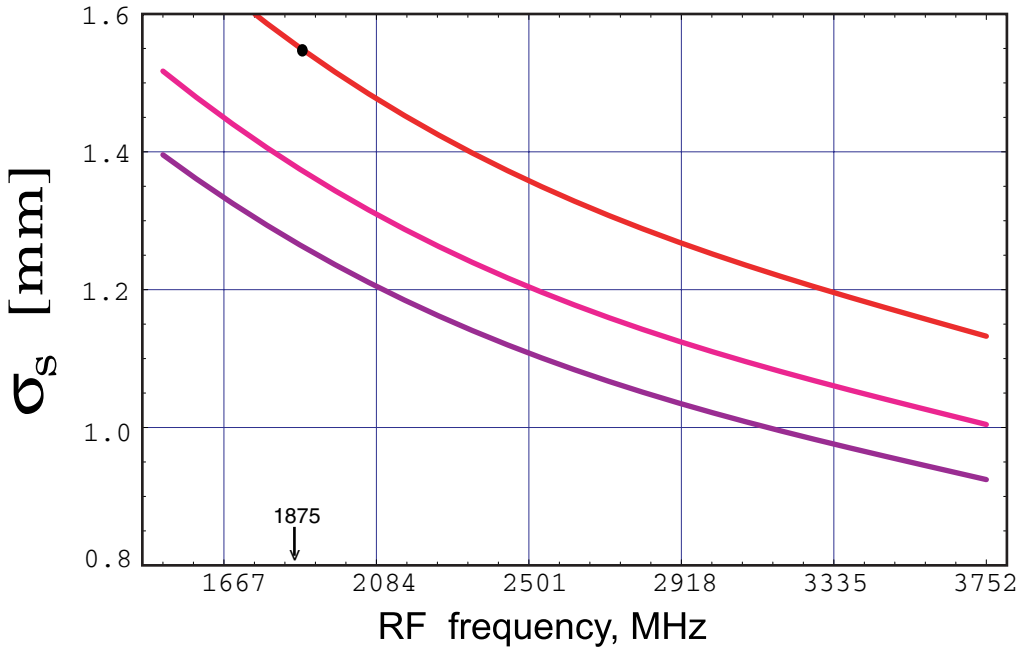


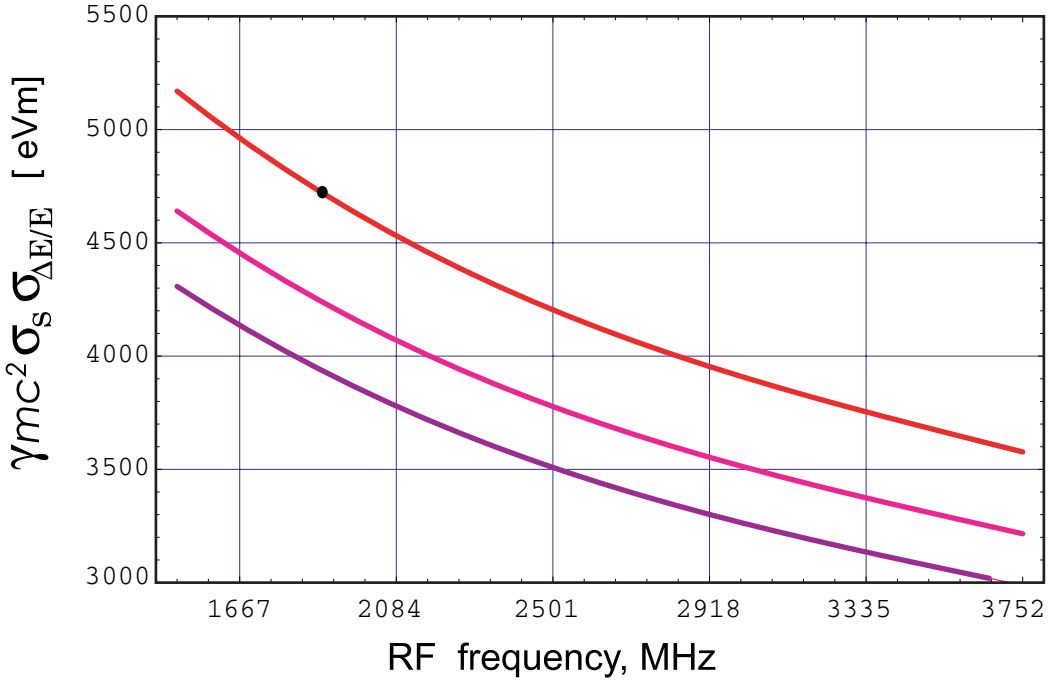
V_{rf} 2.39 MV

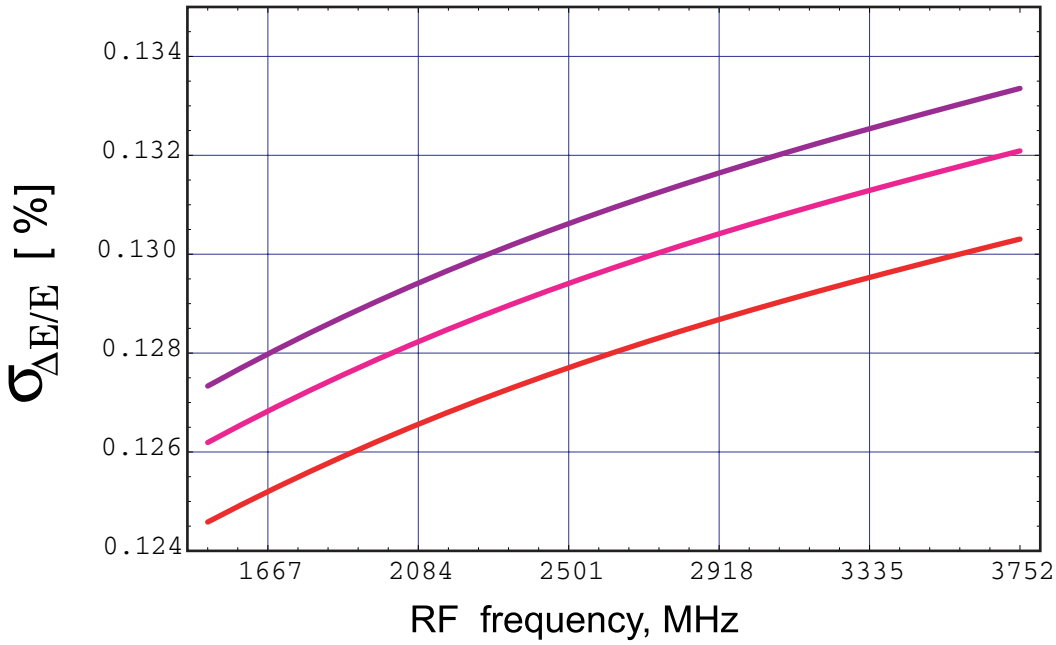
V_{rf} 2.59 MV

V_{rf} 2.79 MV

bunch length & energy spread dependence on RF frequency (bunch spacing is equal to RF wave length) at betatron coupling 0.6 %, bunch population 2.56 x 10^9, wiggler field 1.7 T





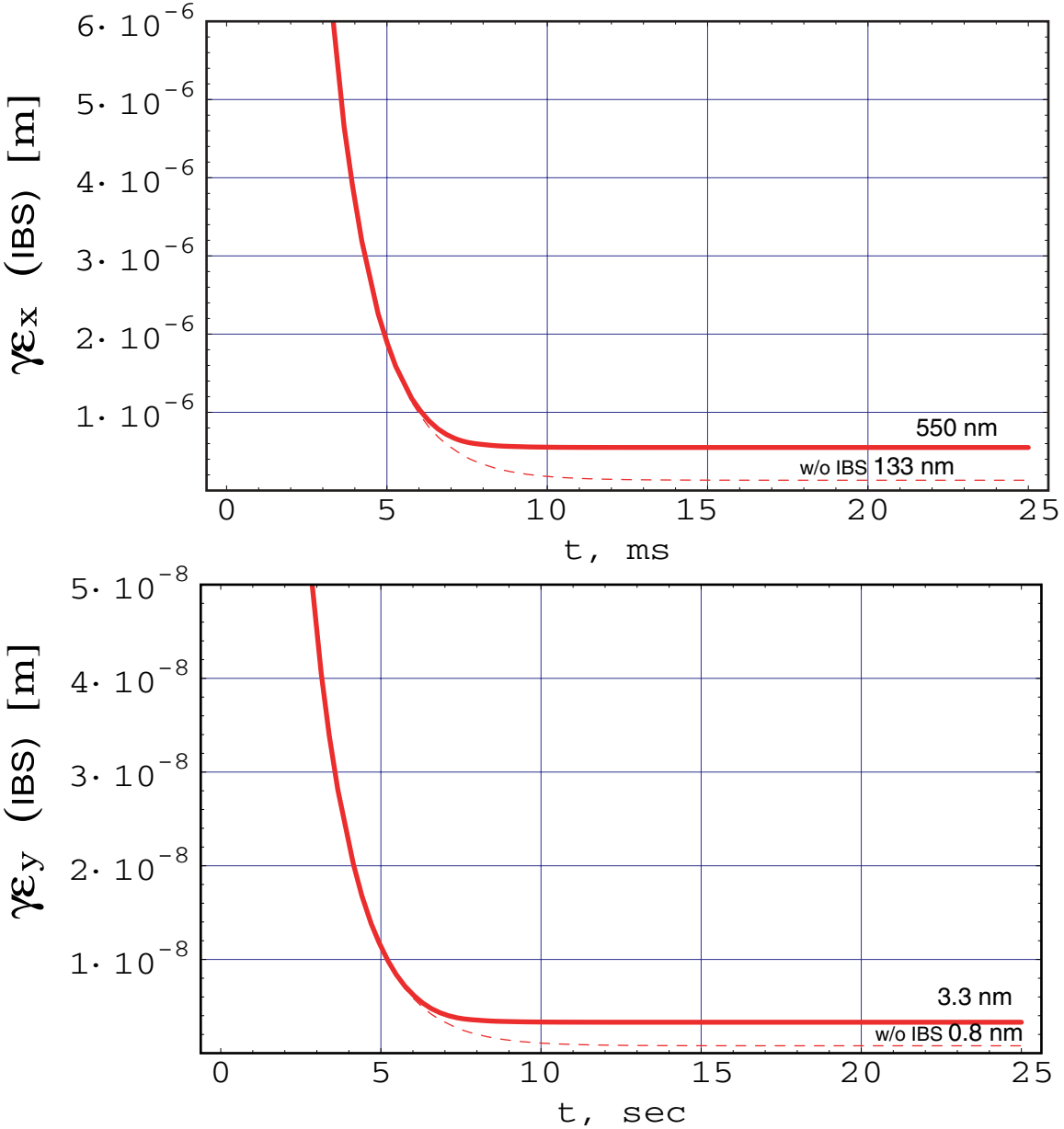


V_{rf} 2.39 MV

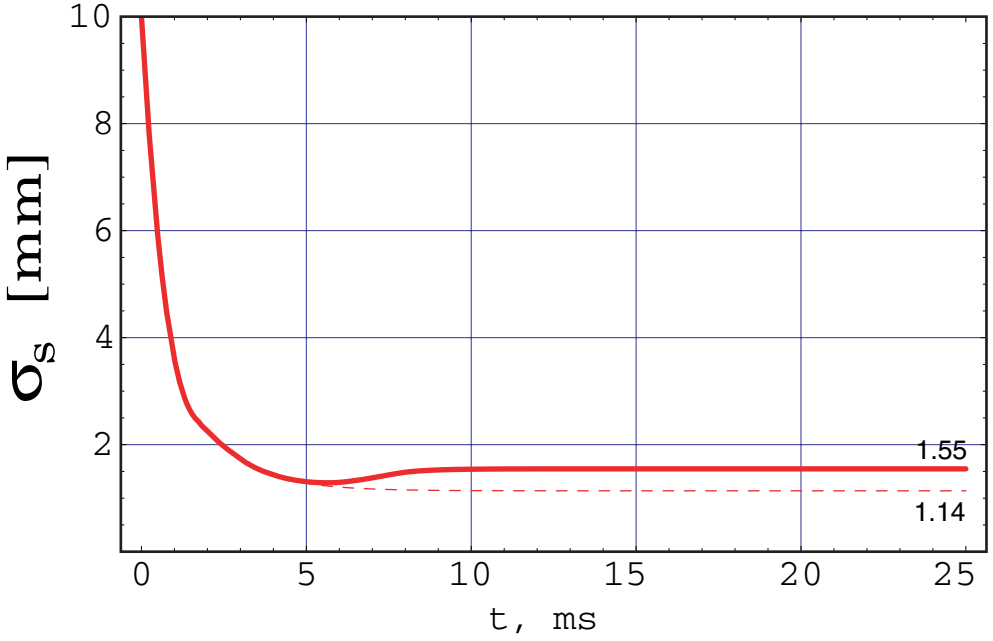
V_{rf} 2.59 MV

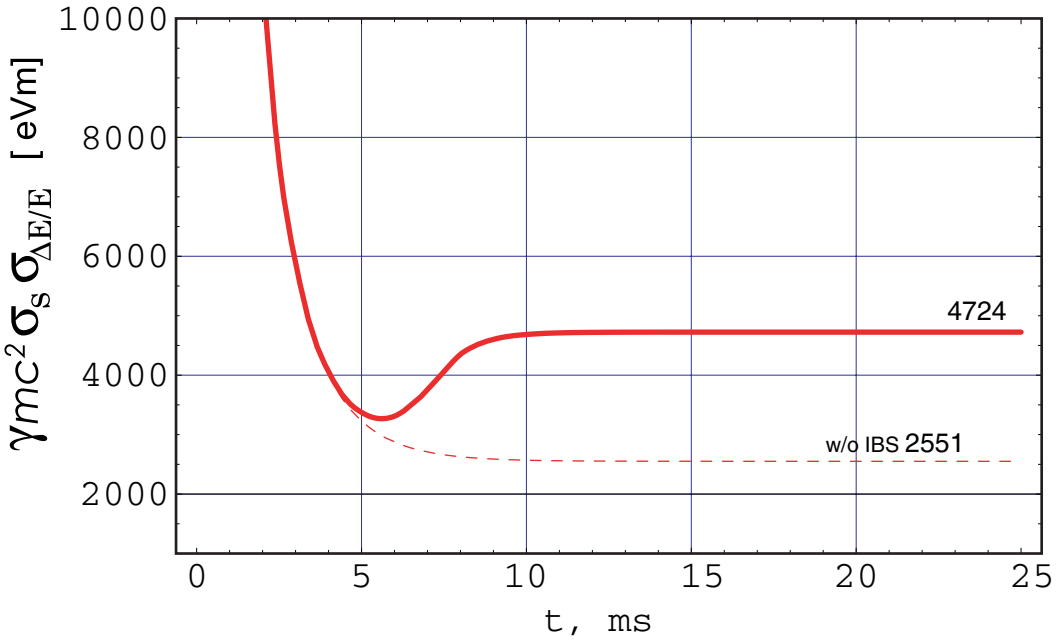
V_{rf} 2.79 MV

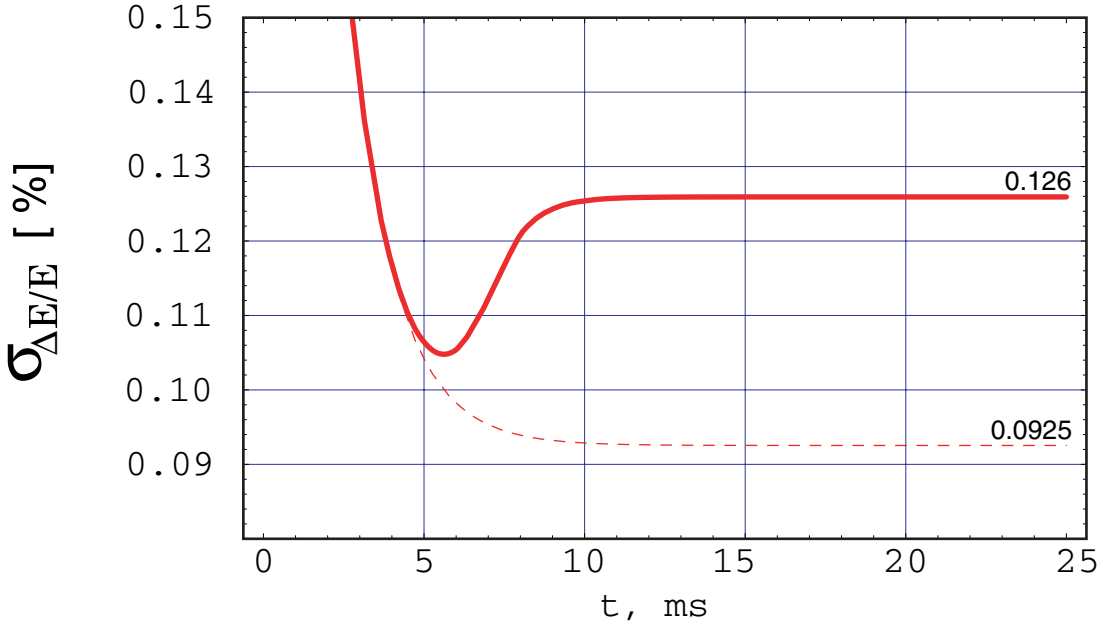
Emittances evolution at betatron coupling 0.6 %, Vrf 2.39 MV, bunch spacing 16 cm, bunch population 2.56 x 10^9, wiggler field 1.7 T



bunch length, energy spread, longitudinal emittance at betatron coupling 0.6 %, Vrf 2.39 MV, bunch spacing 16 cm, wiggler field 1.7 T

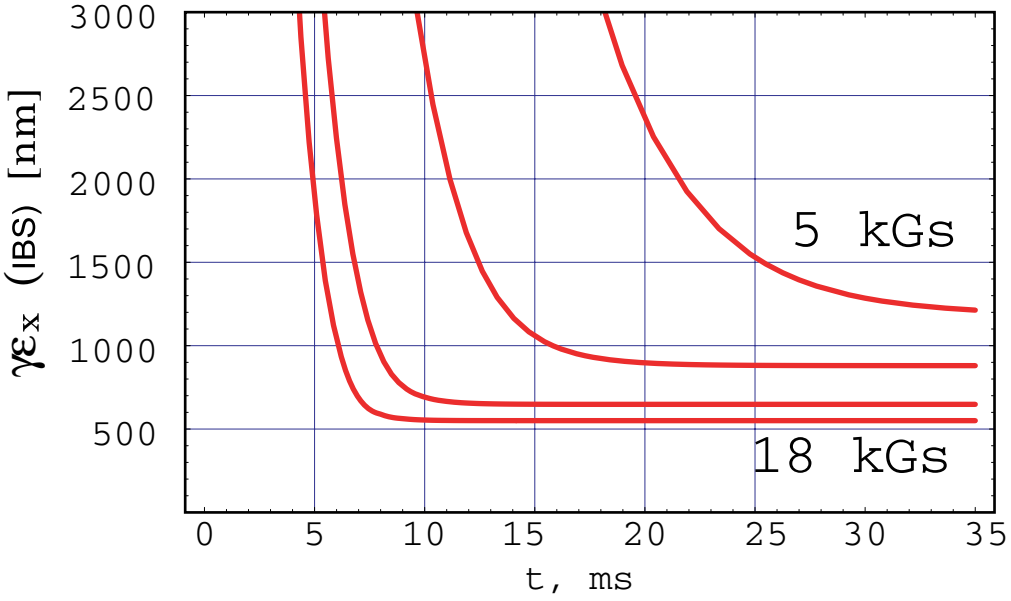


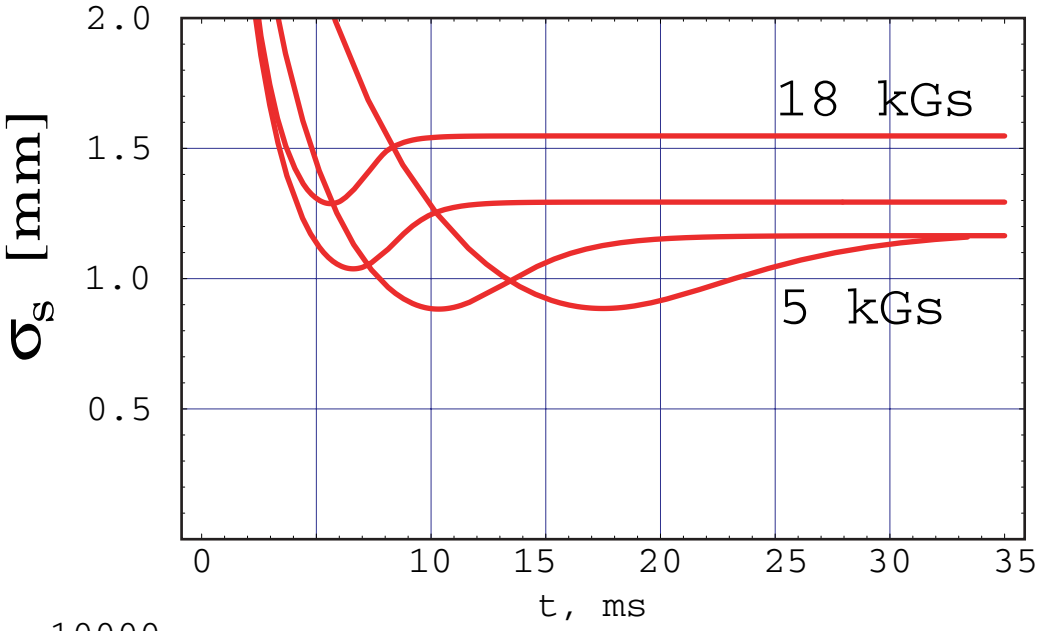


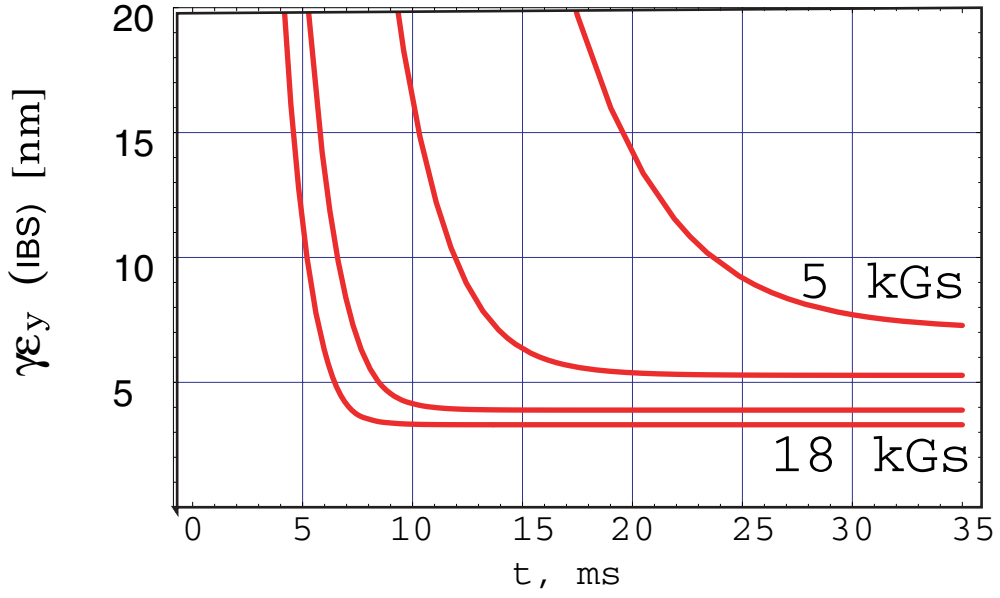


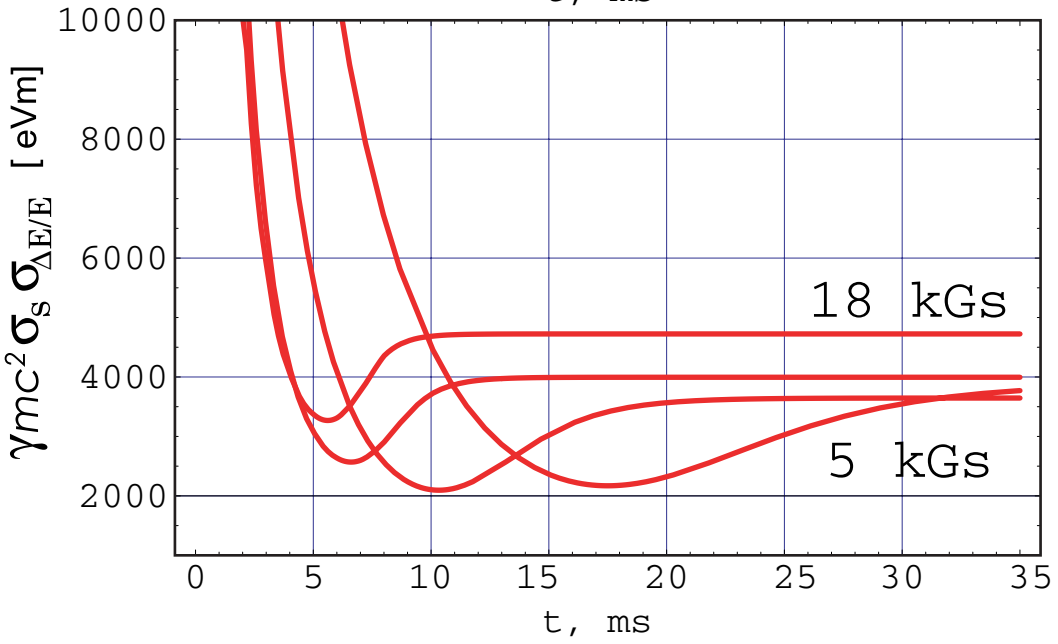
bunch population 2.56 x 10^9

Emittance & bunch length evolution in CLIC_DR with wiggler period of 10 cm at wiggler field of 0.5, 1.0, 1.5 and 1.8 T. Energy is 2.424 GeV, betatron coupling 0.6 %, bunch population 2.56×10^9, RF: 2.39 MV, 1875 MHz (bunch spacing 16 cm)

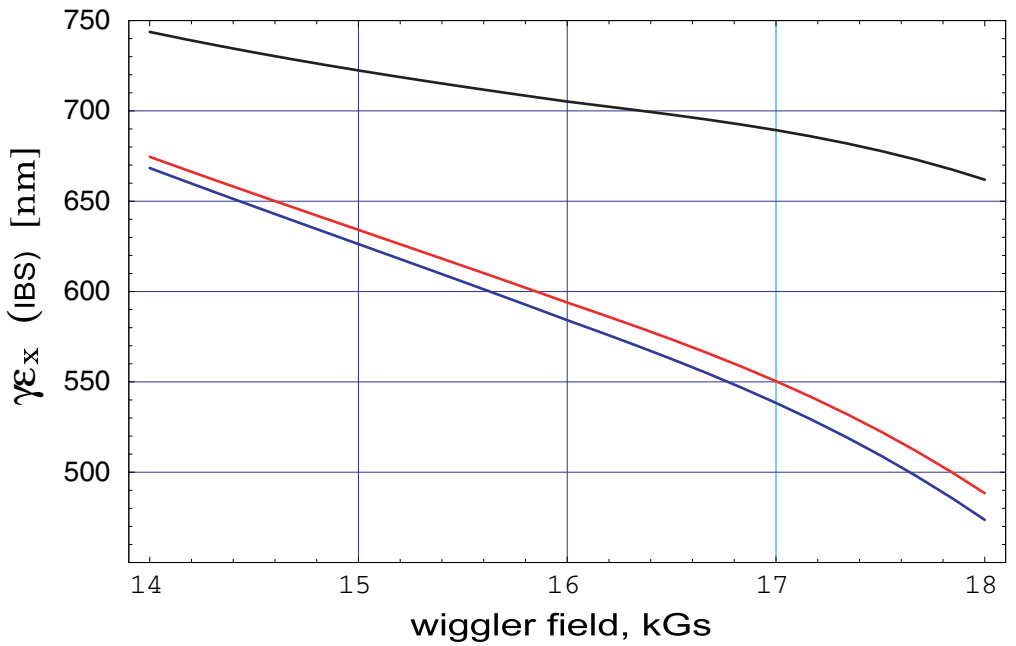


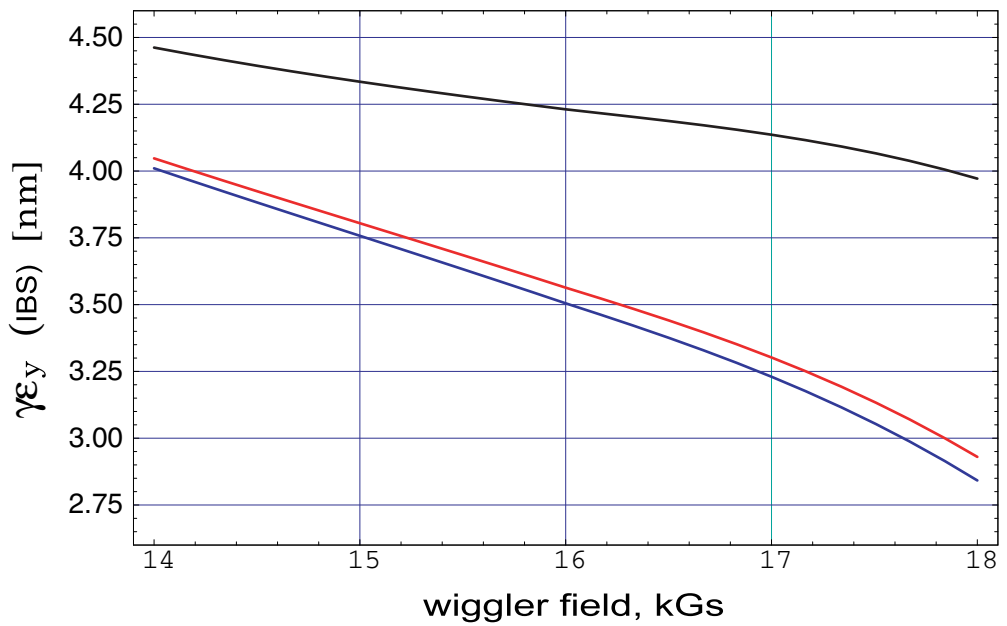


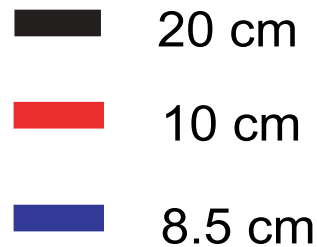




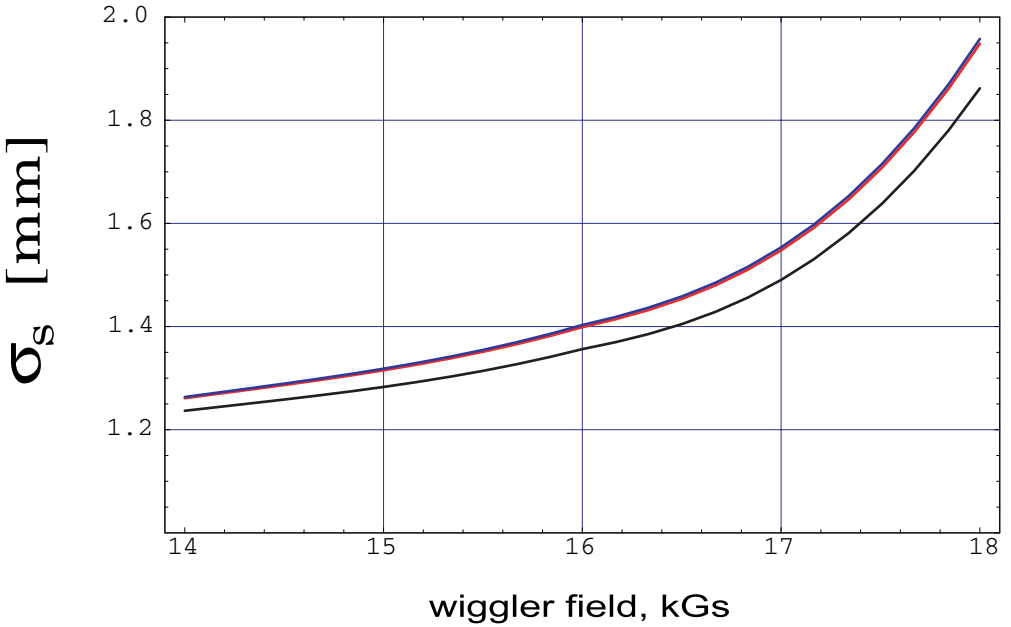
emittances dependence on wiggler field, bunch spacing 16 cm (1875 MHz)
at betatron coupling 0.6 %, bunch population 2.56 x 10^9 RF voltage 2.39 MV

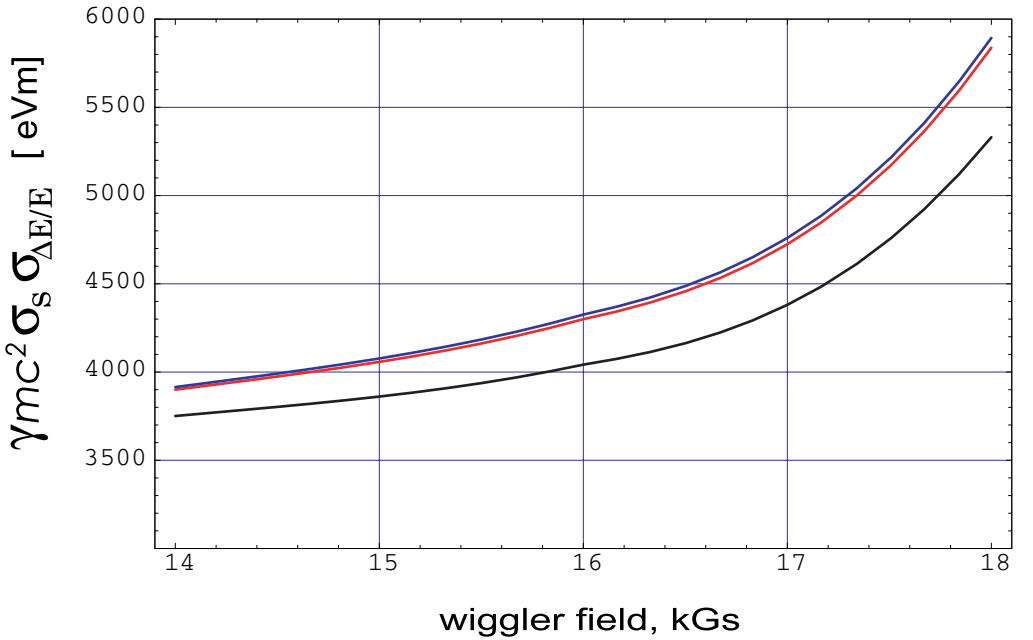


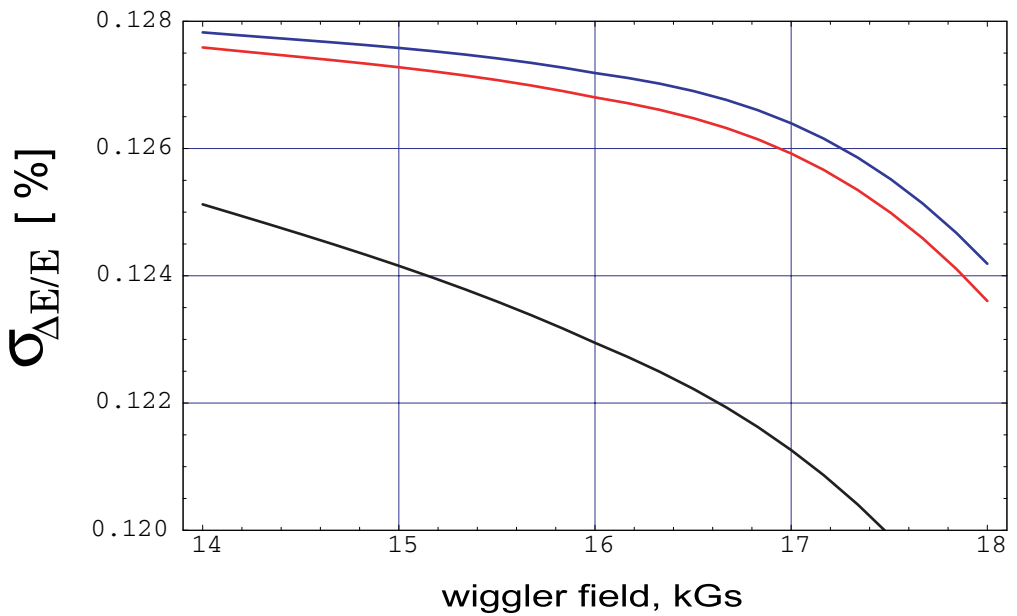




bunch length & energy spread dependence on wiggler field, bunch spacing 16 cm (1875 MHz)
at betatron coupling 0.6 %, bunch population 2.56 x 10^9, RF voltage 2.39 MV







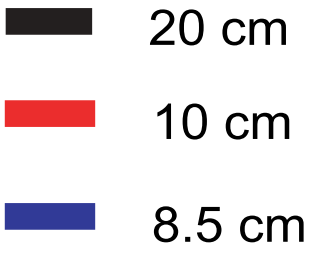


Table 1: CLIC damping ring parameters.

Parameter	**Symbol**	**Value**
Nominal e^+ ring energy	γmc^2	2.424 [GeV]
Ring circumference	C	360 [m]
No. of bunch trains stored	N_{train}	14
No. of bunches per one train	N_{bunches}	111
Betatron coupling	$\varepsilon_{y0}/\varepsilon_{x0}$	0.6%
X-betatron tune	Q_x	69.82
Y-betatron tune	Q_y	34.86
Damping time	τ_x	2.81 [msec]
Damping time	τ_y	2.81 [msec]
Damping time	τ_t	1.405 [msec]
Extracted hor. emittance	$\gamma\varepsilon_x$	550 [nm]
Extracted vert. emittance	$\gamma\varepsilon_y$	3.3 [nm]
Extracted energy spread	σ_δ	1.26×10^{-3}
Extracted bunch length	σ_s	1.55 [mm]
Horiz. emittance w/o IBS	$\gamma\varepsilon_{nx0}$	134 [nm]
Energy loss per turn	U_0	2.074 [MeV]
Momentum compaction	α_p	0.807×10^{-4}
RF voltage	V_m	2.39 [MV]
RF frequency	f_{rf}	1875 [MHz]
Revolution time	T_r	1.213 [μs]
Harmonic number	h	2250