Table 1: Key parameters of the BDS at 500 GeV CM. Effective values are given for the IP parameters.

Parameter	Units	Value
Length (linac exit to IP distance)/side	m	1750
Maximum Energy/beam	TeV	0.25
Distance from IP to first quad, L*	m	4.3
Crossing angle at the IP	mrad	18.6
Nominal core beam size at IP, σ^*, x/y	nm	202/2.3
Nominal beam divergence at IP, θ^*, x/y	μrad	25/23
Nominal beta-function at IP, β^*, x/y	mm	8/0.1
Nominal bunch length, σ_z	μm	72
Nominal disruption parameters, D, x/y		0.1/12
Nominal bunch population, N		6.8×10^9
Beam power in each beam	MW	4.9
Preferred entrance train to train jitter	σ	< 0.2
Preferred entrance bunch to bunch jitter	σ	< ?
Typical nominal collimation aperture, x/y	σ_x/σ_y	10/55
Vacuum pressure level, near/far from IP	nTorr	100/10

0.1 Beam Delivery Systems at 500 GeV

0.1.1 Overview

The design of the CLIC BDS at 500 GeV follows the same philosophy and criteria as for the nominal design at 3 TeV, see **??**. Therefore both designs consist of the same sections and fullfil the same functions. The constrains applied to 500 GeV design follow:

1. The IP must be at the same location at 500 GeV and at 3 TeV. The crossing angle can vary slightly.
2. The linac location and orientation must remain unchanged at both energies.
3. The two BDS designs must fit in the same tunnel of 5.3 m diameter.
4. The BDS at 500 GeV can be shorter to reduce the cost of the first stage.

0.1.2 Beam parameters

Table 1 shows the key BDS parameters. The IP beam parameters are shown at 0.5 TeV CM.

0.1.3 Systems

The diagnostics and collimation sections of the 500 GeV BDS have been scaled down from the 3 TeV design. Since the emittance is larger the lower energy beta functions can be lower and still meet the 1 μm beam size at the laser wire and guarantee survivability of the first collimator. The bending angles at 500 GeV need to be larger in order to increase dispersion and better cancel the chromatic aberrations. The final layout is obtained by slightly varying the IP crossing angle and the collimation bending angles until the above constrains are satisfied. The resulting optics and layout are displayed in Fig. 1. The maximum deviation between the 500 GeV and the 3 TeV layout is 40 cm. This is consistent with a common tunnel of 5.3 m diameter. The IP crossing angle is 18.6 mrad instead of the 20 mrad at 3 TeV. This variation is considered affordable to the detector and the post-collision line, see **??** and **??**, respectively.

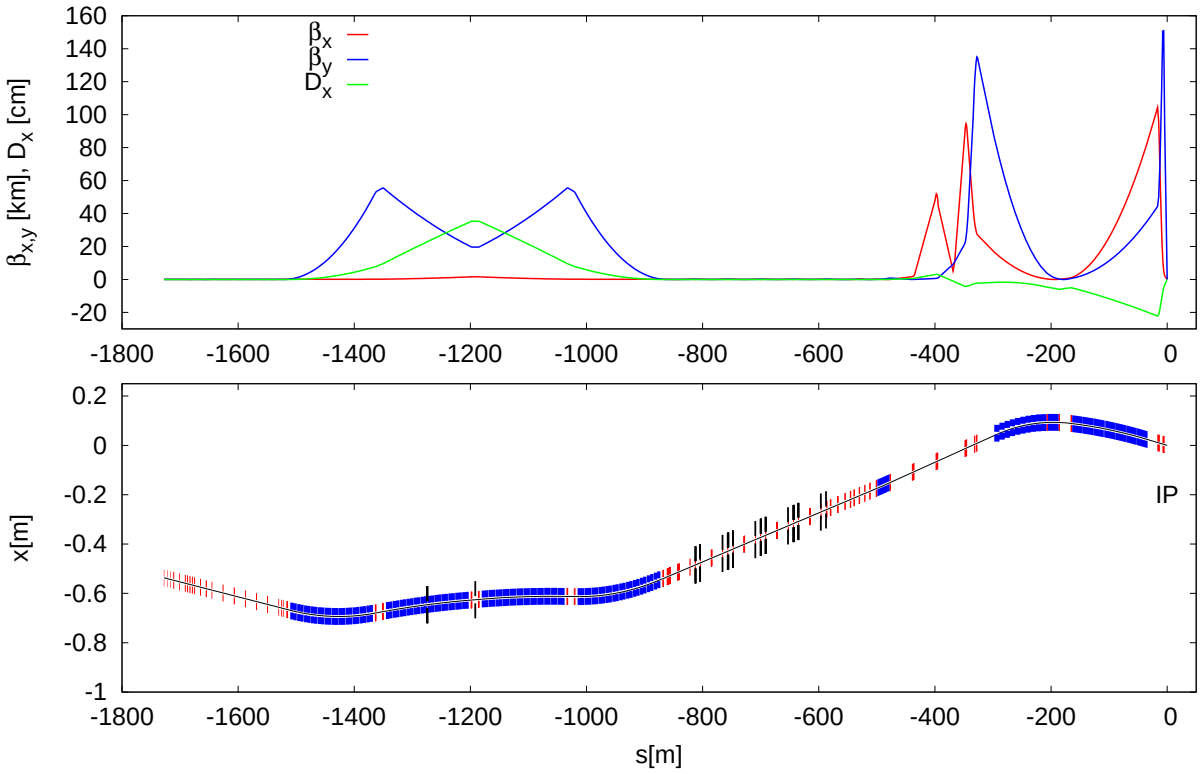

Fig. 1: CLIC 500 GeV optics (top) and layout (bottom). Dipoles, quadrupoles and collimators are shown in blue, red and black, respectively on the layout plot.

References

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