HIGH-ENERGY COLLIDER PARAMETERS: e^+e^- Colliders (II)

The numbers here were received from representatives of the colliders in 1993 or early 1994. Numbers are subject to change. Quantities are, where appropriate, r.m.s. H, V, and, s.c. indicate horizontal and vertical directions, and superconducting.

	BEPC (China)	VEPP-4M (Novosibirsk)	TRISTAN (KEK)	SLC (SLAC)	LEP (CERN)
Physics start date	1989	1994	1987	1989	1989
Maximum beam energy (GeV)	2.2	6	32	50	55
Luminosity (10^{30}cm^{-2}s^{-1})	10	50	37	0.35	11
Time between collisions (μs)	0.8	0.6	5	8300	22
Crossing angle (μ rad)	0	0	0	0	0
Energy spread (units 10^{-3})	0.58	1	2.3	3	1.0
Bunch length (cm)	≈ 5	5	1.5	0.1	1.8
Beam radius (10^{-6} m)	H: 926 V: 61	H: 1000 V: 30	H: 280 V: 8	H: 2.5 V: 0.8	H: 200 V: 8
Free space at interaction point (m)	± 2.5	± 2	± 2.51	± 2.8	± 3.5
Luminosity lifetime (hr)	7–12	2	2	—	20
Filling time (min)	30	15	40	—	90
Acceleration period (s)	120	150	300	—	320
Injection energy (GeV)	1.3	2	8	50	20
Transverse emittance ($10^{-9}\pi$ rad-m)	H: 660 V: 43	H: 400 V: 20	H: 25.5 at 29 GeV	H: 0.6 V: 0.6	H: 36 V: 2
β^*, amplitude function at interaction point (m)	H: 1.3 V: 0.085	H: 0.75 V: 0.05	H: 1.0 V: 0.04	H: 0.01 V: 0.006	H: 1.00 V: 0.04
Beam-beam tune shift per crossing (units 10^{-4})	420	500	340	—	420
RF frequency (MHz)	199.53	180	508.5808	—	352.2
Particles per bunch (units 10^{10})	20 at 2 GeV	15	22	3.0	41.6
Bunches per ring per species	1	2	2	1	$4e^+ + 4e^-$ $8e^+ + 8e^-$
Average beam current per species (mA)	40 at 2 GeV	40	7	0.0006	3
Beam polarization (%)	—	—	—	e^-: 62	—
Circumference or length (km)	0.2404	0.366	3.02	1.45 +1.47	26.66
Interaction regions	2	1	4	1	4
Utility insertions	4	1	8	—	4
Magnetic length of dipole (m)	1.6	2	5.86	2.5	11.66/pair
Length of standard cell (m)	6.6	7.2	16.1	5.2	79
Phase advance per cell (deg)	≈ 60	65	60	108	60+90
Dipoles in ring	40 + 4 weak	78	264 +8 weak	460+440	3280+24 inj. + 64 weak
Quadrupoles in ring	68	150	392	—	520+288 + 8 s.c.
Peak magnetic field (T)	0.9028	0.6	0.41 at 30 GeV	0.597	0.135