BEAM REQUIREMENTS (10/31/01)

Parameter	Nominal Value and Range	stability (during 8 hours) (note 1)	helicity correlated unbalance averaged over 1 hour
rms spot size at the target	A: $\sigma_{x \text{ and } y}$ = 50 to 200μm; B: 50 < $\sigma_{x \text{ and } y}$ < 250 μm; C: $\sigma_{x \text{ and } y}$= 100 to 500μm A & C may request specific sizes (note 2)	A & C: 25% of requested value; B: any value within nominal range	A & C: 100% of nominal size; B: 60 μm
angular divergence at the target	$\sigma_{x'}$, $\sigma_{y'}$ < 100 μr	50% of value	100% of beam divergence tolerance
Beam position	any value requested by experiment within 3 mm of optics axis	drifts A: < 50% of spot size; B: < 120 μm; C: < 250 μm; transients A, B, C: < 1 mm	A & C < 10 μm; B < 60 μm
Beam direction	any value requested by experiment within 1 mr of optics axis to dump center	< 50 μr (1/2 beam divergence tolerance)	100% of beam divergence tolerance
Energy (average)	multipass operation: 0.63 to 5.75 GeV; 1 pass 1 hall dedicated operation: 0.33 GeV to 0.63 GeV	A or C: ΔE/E < 1E-4 B: ΔE/E < 5E-4 and ΔE/E < 1E-3 over days for all	100% of energy spread tolerance
Energy Spread (1σ)	A & C: σ_E/E < 5E-5 for E>1GeV B: σ_E/E < 4E-4	A & C: σ_E/E < 5E-5 for E>1GeV B: σ_E/E < 4E-4	X
Parameter	**Nominal Value and Range**	**stability (during 8 hours) (note 1)**	**helicity correlated unbalance averaged over 1 hour**
Background (Beam halo) close to the target	A, B, C: < 1 E-4 outside of a 5 mm radius **(notes 3 & 4)**	any value within the nominal range	100% of nominal halo tolerance
CW average current (Note: 5 & 6)	1 μA < A < 120 μA 1 nA < B < 1 μA 1 μA < C < 120 μA A+C < 180 μA ; A + C < 800 KW A or C < 180 μA (single hall)	within +/- 5% of nominal value (includes high frequency fluctuations)	A < 200 ppm; B & C< 1000 ppm 3 Halls: excursions of 5 second samples up to 5 times the nominal value are acceptable.
Polarization (current range to be determined between physics and Accelerator Divisions)	> 70% all halls with currents up to 100 μA in A or C	polarization > 70%	X
Effective duty factor DF	loss (1-DF) including trips: < 5% @ 0.33 to 5 GeV (5 + (E-5)*20) % @ 5 to 6 GeV	X	X

note 1: With continuous monitoring the beam is good when within tolerances. With invasive diagnostics, one does not know the beam quality between measurements. The user accepts the uncertainty except if he can provide a continuous non-invasive diagnostic.

note 2: Some beam size requests in the range will preclude the Moller optics to be the same as the beam-delivery-on-target optics

note 3: After the halo monitors for halls A and C are operational

note 4: Hall A requests for FY2002 that the total halo outside a 5 mm radius be < 10-(

note 5: Lower currents can be delivered with relaxed tolerances

note 6: Proper impingement on beam dump has to be checked with accelerator operation (centering on dump face, current density on dump face, visibility on dump viewer, amount of radiation in the hall, on the site, etc…

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