

## SNS End-to-End Simulation & Beam Evolution

	<b>IS/LEBT</b>	<b>RFQ</b>	<b>MEBT</b>	<b>DTL</b>	<b>CCL</b>	<b>SCL (1)</b>	<b>SCL (2)</b>	<b>HEBT</b>	<b>Ring</b>	<b>RTBT</b>	<b>Target</b>	<b>Unit</b>
<b>Energy, W (in)</b>		0.065	2.5	2.5	86.8	185.6	382.2 (+/-)	972.3 (+/-)	972.3 (+/-)	972.3 (+/-)	972.3 (+/-)	MeV
<b>DW</b>							0.26-0.43	0.5	26+26 120+120	26+26 120+120		
<b>e (n, rms)</b>	0.09/0.2	0.21	0.27									mm mr
<b>e (un, 99%)</b>												mm mr
<b>DE (rms)</b>		0.009	0.017				0.33					MeV
<b>DE (com)</b>							2.2 (+/-)	0.2 (+/-)				MeV
<b>DE (full)</b>								4 (+/-)	10 (+/-)	10 (+/-)		MeV
<b>I (out, peak)</b>	65	52	52	52	52	52	52	52				mA
<b>Length</b>	0.12	3.72	3.66	36.81	57.47	64.229	172.45	169.49	248	150.75		m
<b>Codes used</b>	IGUN	PARMTEQ	PARMILA	PARMILA	PARMILA	PARMILA	PARMILA	PARMILA	UAL/ORBIT	PARMILA		
<b>N (macro)</b>	200	1e4/1e6	1e4/1e6	1e6/1e5	1e6/1e5	1e6/1e5	1e6/1e5	1e6/1e5	4.e4/1.e5	1e5		
<b>random seeds</b>	1	10/100	10/100	1/10	1/10	1/10	1/10	1/10	10	10		
<b>Loss (control)</b>	0.27		0.05					0.001	0.02 - 0.1			
<b>Loss (uncont.)</b>		0.08	< 0.01					1.e-5	0.00014		0.04	
<b>e (rms) growth</b>		5%	29%						11% 20%	5% 10%		
<b>e (99%) growth</b>												
<b>Included</b>	sp. ch. Initial electrns	sp. ch. align err.	sp. ch. Quad mag. err	space charge rf phase/amp. error quad gradient error quad roll cavity-to-cavity tilt	space charge rf phase/amp. error quad gradient error Lorentz detuning quad roll cavity-to-cavity tilt	sp. ch. rf error quad err	painting space charge magnet error misalign quad roll	sp. ch. rf error quad err magnet offset	sp. ch. rf error quad err misalign quad roll	window scatt.		
<b>Excluded</b>	Dumping mag field misalign	Fringe errors		quad misalignment multipoles	quad misalignment multipoles missing cavities rematching	linac H0 foil/collim scatt.	impedance quad roll scattering beam loading collimation fringe field		collimator scattering			
<b>Open issues</b>	no direct LEBT-RFQ handover will use msrd LEBT distrib.s								ext kicker imp electron cloud			

**Note:** (a) obtained from 1000 envelope runs

- (b) machine length finalized July 2000
- (c) LEBT length only, for simulation
- (d) FES; different codes for different components!
- (e) LBNL: 1e4; LANL: up to 1e6
- (f) 32% combined chopping on LEBT and MEBT targets
- (g) RFQ non-capture & radial loss; MEBT recombination

**Note**

(a)

(b,c)

(d,e)

(f)  
(g)

