Energy loss, Emittance Dilution (7-pass FFAs)

	E [GeV]	ρ [m]	ΔE [MeV]	<H> [m]	$\Delta\varepsilon_N [m\,rad]$	$\Delta\sigma_{\Delta E/E}$	σ[mm]
FFA 9	10.43	70.6	7	4.0E-03	1.9E-05	3.2E-04	0.6
FFA 10	11.51	70.6	11	4.0E-03	1.9E-05	3.7E-04	0.7
FFA 11	12.59	70.6	16	4.0E-03	2.0E-05	4.3E-04	0.8
FFA 12	13.67	70.6	22	4.0E-03	2.1E-05	5.1E-04	0.9
FFA 13	14.73	70.6	30	4.0E-03	2.2E-05	6.1E-04	1.1
FFA 14	15.80	70.6	39	4.0E-03	2.3E-05	7.2E-04	1.3
FFA 15	16.85	70.6	50	4.0E-03	2.5E-05	8.5E-04	1.5
FFA 16	17.89	70.6	64	4.0E-03	2.9E-05	1.0E-03	1.8
FFA 17	18.91	70.6	80	4.0E-03	3.3E-05	1.2E-03	2.1
FFA 18	19.92	70.6	99	4.0E-03	4.0E-05	1.4E-03	2.5
FFA 19	20.91	70.6	120	4.0E-03	4.8E-05	1.6E-03	2.9
FFA 20	21.88	70.6	144	4.0E-03	6.0E-05	1.9E-03	3.4
FFA 21	22.83	70.6	170	4.0E-03	7.4E-05	2.2E-03	3.9
FFA 22	23.75	70.6	199	4.0E-03	9.2E-05	2.5E-03	4.4

6 passes

Geometric Arc Radius [m]	80.6

Final Energy [GeV]	24.6
Total Energy Loss [MeV]	1080

Dispersion [m]	1.8
Beampipe Diameter [mm]	22

Slide adapted from Alex Bogacz talk I (Jay Benesch) assert that energy beyond 20 GeV (FFA18) will be subject to excessive beam loss in Halls A and C arcs. Hall D might allow 21 GeV (FFA19) but 19 GeV (FFA17) is more likely for extraction reasons.

- Synchrotron radiation mitigation in FFAs

  - High fill factor (88% space filled with bends) increases significantly the bend radius, ρ.

  - By virtue of extremally small dispersion and betas, the horizontal emittance dispersion, **<H>**, is highly suppressed (factor of 50 lower then in a conventional CEBAF arc lattice).