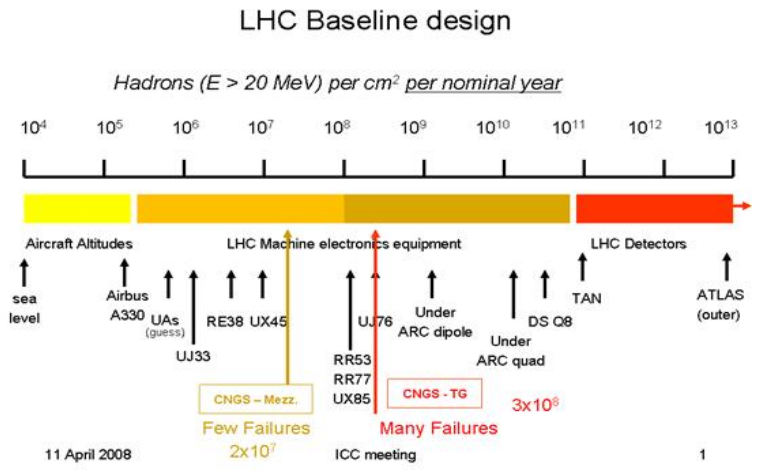
BLM radiation & single event effects

neutrons flux at NY (New York)	fNYC [n/cm2/s)	0.0039	http://www.actel.com/products/rescenter/ser/docs/SERWP.pdf page 6, http://www.research.ibm.com/journal/rd/421/ziegler.html	mission time [h]	12	operation time per year [hours]	4800	
moltipication factor for Geneve	GE	1.43		transmission rate [h]	6.944E-12			

location	device	particle species	cross section [cm2]	flux [1/s/cm2]	flux [1/year/cm2]	flux [1/s/m2]	SEU [1/s]	SEU [1/h]	MTBF [years]	# of components	Unreliability [1/mission]	FD (200 days) [1/year]	integral dose [kGy]	test fluence [prot/cm2/s]	comments, references
surface	ALTERA	muon	6.50E-08	1.00E-04	4.80E-01	1	6.50E-12	2.34E-08	4.88E+03	325	2.81E-07	0.04			wrong muon rate
surface	ALTERA	neutron	6.50E-08	5.56E-03	2.67E+01	5.56E+01	3.61E-10	1.30E-06	8.77E+01	325	1.56E-05	2.03			high neutron flux
surface	ALTERA (EP1S80)	neutron	8.00E-08	5.56E-03	2.67E+01	5.56E+01	4.45E-10	1.60E-06	7.12E+01	325	1.92E-05	2.50			no latch up (see ref. 1)
surface	memory M25P10	hadron	1.00E-07	5.56E-03	2.67E+01	5.56E+01	5.56E-10	2.00E-06	5.70E+01	650	2.40E-05	6.25	3.8E-05		PAMELA_M25P10.pdf, (see ref. 2)
surface	AS7C33512PFS32A	memory neutron	requested	5.56E-03	2.67E+01	5.56E+01	#VALUE!	#VALUE!	#VALUE!	975	#VALUE!	#VALUE!			FW AS7C33512PFS32A reliability.msg, (see ref. 3)
tunnel	ACTEL	hadron / neutron	5.86E-12	6.30E+05	3.02E+09	6.30E+09	3.69E-06	1.33E-02	8.59E-03	640	4.41E-14	0.00			(see ref. 4)
tunnel	Actel (A54SX)	proton	1.50E-15	6.30E+05	3.02E+09	6.30E+09	9.45E-10	3.40E-06	3.35E+01	640	0.00E+00	0.00	3.7		14,SEE test results: Actel Anti-fuse FPGA (see ref. 5)
tunnel	GOL/GOH	hadron / neutron	4.50E-13	6.30E+05	3.02E+09	6.30E+09	2.84E-07	1.02E-03	1.12E-01	1280	5.05E-29	0.00	3.1	3.00E+08	
tunnel	ADC	hadron / neutron	n/a	1.00E+02	4.80E+05	1.00E+06	#VALUE!	#VALUE!	#VALUE!	5120	#VALUE!	#VALUE!			



references:

1 http://www.altera.com/products/devices/stratix/features/stx-seu.html
2 http://cern.ch/blm/Radiation/cosmic_rays
3 http://cern.ch/blm/Radiation/cosmic_rays
4 http://www.actel.com/documents/RadResultsIROCreport.pdf http://ab-div-bdi-bl-blm.web.cern.ch/ab-div-bdi-bl-blm/Acquisition_system/CFC/actel_louvain_001023.pdf.gz
5 http://lhc-workshop-2004.web.cern.ch/lhc%2Dworkshop%2D2004/presentations/fukanaga.ppt#269,14,SEE test results: Actel Anti-fuse FPGA