A proposal of

Upgrade Scenario to Ecm = 12 GeV

Kikuchi, M., 2011.12.1

- Energy limit of BT positron line
  E(e+) = 4.05 GeV (Power supplies limit)
- Energy limit of BT electron line
  E(e-) = 8.465 GeV (Magnet coils limit)

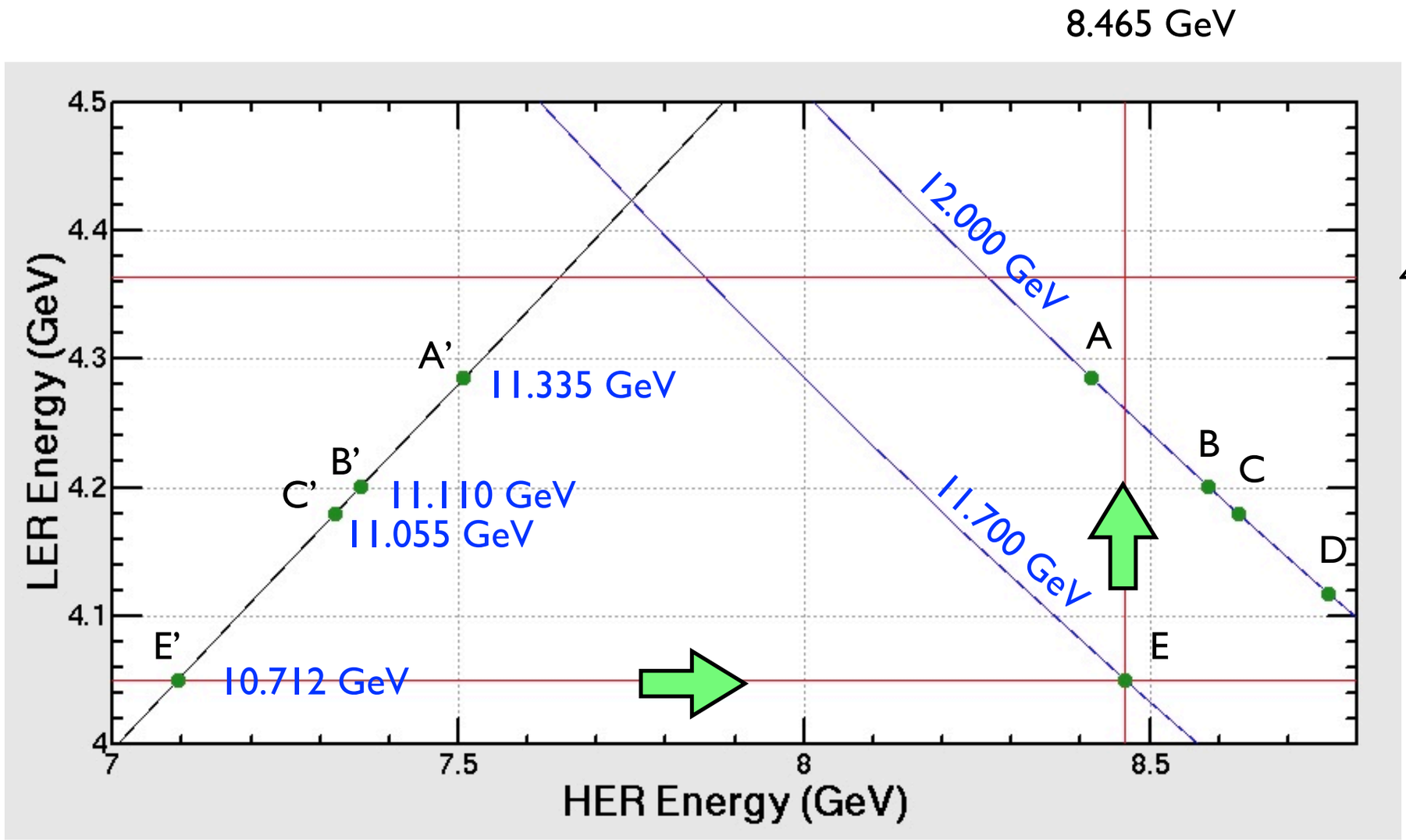
⟶ Ecm = 11.7 GeV is available without modification

- Upgrade the power supplies of Positron BT
  E(e+) = 4.26 GeV (Magnet coils limit)

⟶ Ecm = 12.0 GeV is possible if QCS magnets withstand

- For the QCS, optimization of operation points(B, C rather than A etc,) may be possible by increasing electron energy(and decreasing positron energy), with a risk of damage to the magnet coils of electron BT

運転エネルギー



A' = { 7.5078, 4.2857 }
B' = { 7.3589, 4.2007 }
C' = { 7.3226, 4.18 }

E' = { 7.0949, 4.05 }

A = { 8.4145, 4.2857 } : QC1LP = 90%
B = { 8.5847, 4.2007 } : QC1LP = QC1LE = 88.21%
C = { 8.6273, 4.18 } : QC1LP = 87.78% QC1LE=88.64%
D = { 8.7588, 4.1173 } : QC1LE = 90%
E = { 8.465, 4.05 } : Limit of BT

707,396
89.159

Electron BT Line for “D” point

!generated by bt-6.156om_8.6GeV

PS_name	Max cur	Cur_set (8GeV)	Cur_mon (8GeV)	f=Cur_mon/ Cur_set	Cur_set (8.76GeV)	f*Cur_set (8.76)	Bfield (8GeV)	Bfield (8.76GeV)	コイル表面温度上昇(8GeV)	コイル表面温度上昇(8.76GeV)
B0E	200	155.629	157.396	1.011	176.622	178.627	1.415	1.549		
BV1E_1_4	200	174.309	177.781	1.020	192.698	196.536	1.036	1.135		
B1E_1_3	200	168.452	168.255	0.999	191.000	191.000	-1.335	-1.462		
B1E_4_6	200	168.676	166.936	0.990	191.377	191.377	-1.335	-1.462		
BH1AE	160	133.105	132.935	0.999	146.224	146.224	0.921	1.008		
BH1E_1_5	220	179.522	179.819	1.002	202.919	203.254	1.237	1.354	22.200	28.457
BH1E_6_10	220	179.617	180.084	1.003	203.026	203.553	1.237	1.354	22.200	28.511
BH1E_11_15	220	179.481	179.765	1.002	202.873	203.192	1.237	1.354	22.200	28.453
BH1E_16_19	220	179.942	179.102	0.995	203.393	203.393	1.237	1.354	22.200	28.364
BH2E_1_5	210	168.903	169.055	1.001	188.029	188.198	-1.168	-1.279	19.700	24.458
BH2E_6_9	210	168.555	169.112	1.003	187.642	188.262	-1.168	-1.279	19.700	24.576
BH3E_1	210	175.979	175.864	0.999	200.052	200.052	1.185	1.297	21.600	27.914
BH3E_2_5	210	174.842	172.279	0.985	196.066	196.066	1.185	1.297	21.600	27.162
BH3E_6_10	210	175.128	172.698	0.986	196.387	196.387	1.185	1.297	21.600	27.162
BV2E_1_4	200	176.422	179.805	1.019	195.332	199.077	1.046	1.146	7.300	9.295
BH4E_1_9	200	169.235	168.719	0.997	186.608	186.608	-1.058	-1.158	10.200	12.402
BH4E_10_11	200	168.858	168.459	0.998	186.125	186.125	-1.054	-1.154	10.200	12.393

- 8.76 GeV:
  - 電源 1 台更新
  - コイル温度～60℃

Electron BT Line for “E” point

!generated by bt-6.156om_8.6GeV

PS_name	Max cur	Cur_set (8GeV)	Cur_mon (8GeV)	f=Cur_mo/ Cur_set	Cur_set (8.465GeV)	f*Cur_set (8.465GeV)	Bfield (8GeV)	Bfield (8.465GeV)	コイル表面温度上昇 (8GeV)	コイル表面温度上昇 (8.465GeV)
B0E	200	155.629	157.396	1.011	168.135	170.043	1.415	1.497		
BV1E_1_4	200	174.309	177.781	1.020	185.249	188.939	1.036	1.097		
B1E_1_3	200	168.452	168.255	0.999	181.886	181.886	-1.335	-1.413		
B1E_4_6	200	168.676	166.936	0.990	182.184	182.184	-1.335	-1.413		
BH1AE	160	133.105	132.935	0.999	141.084	141.084	0.921	0.975		
BH1E_1_5	220	179.522	179.819	1.002	192.994	193.313	1.237	1.309	22.200	25.742
BH1E_6_10	220	179.617	180.084	1.003	193.096	193.598	1.237	1.309	22.200	25.790
BH1E_11_15	220	179.481	179.765	1.002	192.950	193.255	1.237	1.309	22.200	25.738
BH1E_16_19	220	179.942	179.102	0.995	193.446	193.446	1.237	1.309	22.200	25.657
BH2E_1_5	210	168.903	169.055	1.001	180.128	180.290	-1.168	-1.236	19.700	22.446
BH2E_6_9	210	168.555	169.112	1.003	179.757	180.351	-1.168	-1.236	19.700	22.554
BH3E_1	210	175.979	175.864	0.999	189.643	189.643	1.185	1.254	21.600	25.084
BH3E_2_5	210	174.842	172.279	0.985	187.170	187.170	1.185	1.254	21.600	24.753
BH3E_6_10	210	175.128	172.698	0.986	187.476	187.476	1.185	1.254	21.600	24.753
BV2E_1_4	200	176.422	179.805	1.019	187.645	191.242	1.046	1.107	7.300	8.578
BH4E_1_9	200	169.235	168.719	0.997	179.619	179.619	-1.058	-1.119	10.200	11.490
BH4E_10_11	200	168.858	168.459	0.998	179.189	179.189	-1.054	-1.115	10.200	11.486

- 8.465 GeV:　コイル温度～56℃

Positron BT Line for “A” point

!generated by bt+9.154om_4GeV

PS_name	Max cur	Cur_set (3.5GeV)	Cur_set (4GeV)	Cur_set (4.18GeV)	Cur_set (4.29GeV)	Bfield (3.5GeV)	Bfield (4GeV)	Bfield (4.18GeV)	Bfield (4.29GeV)	コイル表面温度上昇 (3.5GeV)	コイル表面温度上昇 (4GeV)	コイル表面温度上昇 (4.18GeV)	コイル表面温度上昇 (4.29GeV)
B1P	180	142.308	164.305	174.107	180.855	−0.990	−1.131	−1.182	−1.212				
B2P_1_2	200	138.776	160.085	169.361	175.356	−0.966	−1.103	−1.153	−1.182				
B3P_1_3	220	164.634	203.750	222.065	233.892	−1.131	−1.292	−1.350	−1.385	7.9	12.1	14.4	15.9
BH1AP	200	114.441	131.234	137.321	140.905	0.798	0.912	0.953	0.977	2.9	3.8	4.2	4.4
BH1BP	100	57.188	65.453	68.436	70.189	0.401	0.459	0.479	0.491	0.7	0.9	1.0	1.1
BH1CP	220	173.864	210.151	228.130	240.319	1.197	1.368	1.429	1.465	9.3	13.6	16.0	17.8
BH1P_10_17	200	154.408	185.444	200.347	210.019	1.069	1.222	1.277	1.309	9.3	13.4	15.7	17.2
BH1P_1_9	200	154.333	185.354	200.250	209.917	1.069	1.222	1.277	1.309	9.3	13.4	15.7	17.2
BH2P_1_7	200	164.737	163.002	173.189	180.045	−1.144	−1.307	−1.366	−1.400	19.0	18.6	21.0	22.7
BH3P_1_3	210	169.844	173.065	184.520	191.854	1.181	1.350	1.410	1.446	20.5	21.3	24.2	26.2
BH3P_4_7	210	169.862	173.065	184.520	191.854	1.181	1.350	1.410	1.446	20.5	21.3	24.2	26.2
BH3P_8_11	210	170.116	173.065	184.520	191.854	1.181	1.350	1.410	1.446	20.5	21.2	24.1	26.1
BH4P_1_10	130	100.858	115.653	121.050	124.240	0.529	0.605	0.632	0.648	8.3	10.9	12.0	12.6
BH4P_5	130	100.858	115.653	121.050	124.240	0.529	0.605	0.632	0.648	8.3	10.9	12.0	12.6
BV1P_1_2	160	124.027	141.972	148.479	152.320	0.676	0.773	0.808	0.828	6.0	7.9	8.6	9.0
BV2P_1_2	230	182.647	217.605	233.470	243.837	1.167	1.333	1.393	1.428	13.0	18.5	21.2	23.2

- 4.18 GeV: - 電源５台更新
  - コイル温度～55℃
- 4.29 GeV: - 電磁石更新（ギャップ変更または新造）
  - 磁場測定
  - コイル温度～60℃

Positron BT Line for “E” point

!generated by bt+9.154om_4GeV

PS_name	Max cur	Cur_set (3.5GeV)	Cur_set (4GeV)	Cur_set (4.05GeV)	Cur_set (4.18GeV)	Bfield (3.5GeV)	Bfield (4GeV)	Bfield (4.05GeV)	Bfield (4.18GeV)	コイル表面温度上昇(3.5GeV)	コイル表面温度上昇(4GeV)	コイル表面温度上昇(4.05GeV)	コイル表面温度上昇(4.18GeV)
B1P	180	142.308	164.305	166.849	174.107	−0.990	−1.131	−1.146	−1.182				
B2P_1_2	200	138.776	160.085	162.544	169.361	−0.966	−1.103	−1.117	−1.153				
B3P_1_3	220	164.634	203.750	208.612	222.065	−1.131	−1.292	−1.308	−1.350	7.9	12.1	12.7	14.4
BH1AP	200	114.441	131.234	132.922	137.321	0.798	0.912	0.923	0.953	2.9	3.8	3.9	4.2
BH1BP	100	57.188	65.453	66.281	68.436	0.401	0.459	0.464	0.479	0.7	0.9	0.9	1.0
BH1CP	220	173.864	210.151	214.821	228.130	1.197	1.368	1.385	1.429	9.3	13.6	14.2	16.0
BH1P_10_1	200	154.408	185.444	189.386	200.347	1.069	1.222	1.237	1.277	9.3	13.4	14.0	15.7
BH1P_1_9	200	154.333	185.354	189.294	200.250	1.069	1.222	1.237	1.277	9.3	13.4	14.0	15.7
BH2P_1_7	200	164.737	163.002	165.679	173.189	−1.144	−1.307	−1.323	−1.366	19.0	18.6	19.2	21.0
BH3P_1_3	210	169.844	173.065	176.106	184.520	1.181	1.350	1.366	1.410	20.5	21.3	22.0	24.2
BH3P_4_7	210	169.862	173.065	176.106	184.520	1.181	1.350	1.366	1.410	20.5	21.3	22.0	24.2
BH3P_8_11	210	170.116	173.065	176.106	184.520	1.181	1.350	1.366	1.410	20.5	21.2	22.0	24.1
BH4P_1_10	130	100.858	115.653	117.148	121.050	0.529	0.605	0.612	0.632	8.3	10.9	11.2	12.0
BH4P_5	130	100.858	115.653	117.148	121.050	0.529	0.605	0.612	0.632	8.3	10.9	11.2	12.0
BV1P_1_2	160	124.027	141.972	143.776	148.479	0.676	0.773	0.783	0.808	6.0	7.9	8.1	8.6
BV2P_1_2	230	182.647	217.605	221.801	233.470	1.167	1.333	1.350	1.393	13.0	18.5	19.2	21.2

- 4.05 GeV:　コイル温度～52℃