PS/AA/Note 87-10
27.7.1987

*POLYNOMIALS FOR SOME KINEMATIC PARAMETERS OF THE ANTIPROTON COLLECTOR AND THE ANTIPROTON ACCUMULATOR**

H. Koziol

This note supersedes PS/AA/Note 86-11. Please destroy the old version.

Parameters such as orbit length, revolution frequency, γ_{tr} or η, are provided by the program ORBIT (B. Autin, M. Bell, S. van der Meer), run on CERN's central computers for a limited number of momenta, expressed in terms of deviation from central orbit momentum, $\Delta p/p_0$, usually in steps of 5 o/oo.

For everyday-work with the machines one needs more finely spaced data; also, most measurements are made as a function of revolution frequency rather than of momentum; and the relations are needed in analytic form for use in applications programs. All these requirements are met by polynomials, fitted to the pointwise calculated ORBIT values. This was done in 1980 and 1981 for the AA.

In 1984 a corrected version of ORBIT was used for the AC, and the AA was recalculated. Based on those outputs, new polynomials for the AC and revised ones for the AA were presented in PS/AA/Note 86-11.

An error in the calculation of η in the presence of octupoles was subsequently detected in ORBIT and duly corrected. The rectified results for

---

* A few words on nomenclature. ACOL was the name of a project which consisted of three activities: the construction of the new antiproton collector ring, the modification of the old antiproton accumulator and the upgrading of the antiproton production. Now that this project is completed, we have a new facility to provide an antiproton flux an order of magnitude higher than before. It is called the :

Antiproton Accumulator Complex	AAC

and its three constituents are:

Antiproton Production	AP
Antiproton Collector	AC
Antiproton Accumulator	AA

the AA are the main reason for the present note. At the same time, some numerical improvements have been made for the AC (since its computer model does not contain octupoles, it had not been affected by the above-mentioned error). All modifications to and runs of the program ORBIT were made by M. Bell.

Parameters are given as function of $\Delta p/p_0$ and of f_{rev}. In the latter case a transformation is necessary: the variable in the polynomials is

$$\Delta f = f_{rev} - f_0$$

where f_0 is the revolution frequency on central orbit.

The coefficients of the polynomials were first obtained with the aid of an HP 9845 program package. They were then truncated to the minimum number of digits required for the intended precision and readjusted for best fit in the range - 30 o/oo $<$ $\Delta p/p_0$ $<$ + 30 o/oo. The full range covered is ± 40 o/oo, since test beams with small horizontal emittance can attain momentum deviations larger than the nominal ± 30 o/oo.

The precision of the polynomial fits, with respect to the ORBIT values, is indicated in the tables. In general, it is an order of magnitude better than required in practice, so as to avoid rounding errors.It is worth pointing out that the AC requires a higher precision in revolution frequency, since its η is much smaller than that of the AA.

First for the AC, then for the AA, the polynomials for various relations are given, followed by print-outs of numerical values. For their perspicuity, graphical presentations are added.

Distribution

G. Adrian	E. Jones	L. Rinolfi
B. Autin	P. Krejcik	L. Søby
M. Bell	J. Kuczerowski	C.S. Taylor
R. Billinge	M. Martini	L. Thorndahl
G. Carron	S. Maury	H.H. Umstätter
F. Caspers	C. Metzger	S. van der Meer
V. Chohan	J. Ottaviani	B. Vandorpe
T. Eriksson	F. Pedersen	E.J.N. Wilson
C.D. Johnson	Y. Renaud	C. Zettler

AC ANTIPROTON COLLECTOR

Kinematic parameters expressed as polynomials $y = a_0 + a_1 x + a_2 x^2 + a_3 x^3 + a_4 x^4$

	a_0	a_1	a_2	a_3	a_4	max. abs. error range of $\Delta p/p_0$:	
$x = \Delta p/p_0$ (‰)		$(\Delta p/p_0)$	$(\Delta p/p_0)^2$	$(\Delta p/p_0)^3$	$(\Delta p/p_0)^4$	± 30 ‰	± 40‰
circumference (m) =	182.4329	$+8.287 * 10^{-3}$	$+2.12 * 10^{-6}$	0	0	0.0001	0.0001
f_{rev} (kHz) =	1589.478	$+3.03 * 10^{-2}$	$-1.642 * 10^{-4}$	$+1.2 * 10^{-7}$	0	0.0004	0.0004
γ_{tr} =	4.694	$-3.42 * 10^{-3}$	$-2.7 * 10^{-6}$	0	0	0.0007	0.0008
η =	0.01906	$-1.87 * 10^{-4}$	$+3 * 10^{-8}$	0	0	0.00001	0.00001
$x = \Delta f$ (kHz)	$\Delta f = f_{rev} - f_0$ $f_0 = 1589.478$	(Δf)	$(\Delta f)^2$	$(\Delta f)^3$	$(\Delta f)^4$		
$\Delta p/p_0$ (‰) =	0	+ 32.9	+ 6.05	+ 2.5	+ 0.77	0.07	0.11
γ_{tr} =	4.694	$-1.14 * 10^{-1}$	$-2.61 * 10^{-2}$	$-6.8 * 10^{-3}$	0	0.001	0.002
η =	0.01906	$-6.2 * 10^{-3}$	$-1.2 * 10^{-3}$	$-3.3 * 10^{-4}$	0	0.00004	0.0001

H.K. 7.87

Program KINACP
H.Koziol, July 1987

AC ANTIPROTON COLLECTOR : SOME PARAMETERS AS FUNCTION OF MOMENTUM
****

E0 = 938.2796 MeV proton rest mass
P0 = 3575.25 MeV/c central orbit momentum

BETA, GAMMA : calculated from DP/P0, using P0 and E0

CIRCUMF, FREV : from polynomial fits to values from program
GAMMATR, ETA : ORBIT, print-out of 30 June 1987

DP/P0 E-3	BETA	GAMMA	CIRCUMF m	FREV kHz	GAMMATR	ETA
-40.0	.96461	3.792	182.1048	1587.996	4.826	.02659
-39.0	.96468	3.796	182.1129	1588.039	4.823	.02640
-38.0	.96475	3.800	182.1211	1588.083	4.820	.02621
-37.0	.96481	3.803	182.1292	1588.126	4.817	.02602
-36.0	.96488	3.807	182.1373	1588.169	4.814	.02583
-35.0	.96495	3.811	182.1455	1588.211	4.810	.02564
-34.0	.96502	3.814	182.1536	1588.253	4.807	.02545
-33.0	.96509	3.818	182.1617	1588.295	4.804	.02526
-32.0	.96516	3.822	182.1699	1588.336	4.801	.02507
-31.0	.96523	3.825	182.1780	1588.377	4.797	.02489
-30.0	.96529	3.829	182.1862	1588.418	4.794	.02470
-29.0	.96536	3.833	182.1944	1588.458	4.791	.02451
-28.0	.96543	3.836	182.2025	1588.498	4.788	.02432
-27.0	.96550	3.840	182.2107	1588.538	4.784	.02413
-26.0	.96556	3.844	182.2189	1588.577	4.781	.02394
-25.0	.96563	3.847	182.2271	1588.616	4.778	.02375
-24.0	.96570	3.851	182.2352	1588.655	4.775	.02357
-23.0	.96576	3.855	182.2434	1588.693	4.771	.02338
-22.0	.96583	3.858	182.2516	1588.731	4.768	.02319
-21.0	.96590	3.862	182.2598	1588.768	4.765	.02300
-20.0	.96596	3.866	182.2680	1588.805	4.761	.02281
-19.0	.96603	3.869	182.2762	1588.842	4.758	.02262
-18.0	.96609	3.873	182.2844	1588.879	4.755	.02244
-17.0	.96616	3.877	182.2926	1588.915	4.751	.02225
-16.0	.96623	3.881	182.3009	1588.951	4.748	.02206
-15.0	.96629	3.884	182.3091	1588.986	4.745	.02187
-14.0	.96636	3.888	182.3173	1589.021	4.741	.02168
-13.0	.96642	3.892	182.3255	1589.056	4.738	.02150
-12.0	.96649	3.895	182.3338	1589.091	4.735	.02131
-11.0	.96655	3.899	182.3420	1589.125	4.731	.02112
-10.0	.96661	3.903	182.3502	1589.158	4.728	.02093
-9.0	.96668	3.906	182.3585	1589.192	4.725	.02075
-8.0	.96674	3.910	182.3667	1589.225	4.721	.02056
-7.0	.96681	3.914	182.3750	1589.258	4.718	.02037
-6.0	.96687	3.917	182.3833	1589.290	4.714	.02018
-5.0	.96693	3.921	182.3915	1589.322	4.711	.02000
-4.0	.96700	3.925	182.3998	1589.354	4.708	.01981
-3.0	.96706	3.928	182.4081	1589.386	4.704	.01962
-2.0	.96712	3.932	182.4163	1589.417	4.701	.01943
-1.0	.96718	3.936	182.4246	1589.448	4.697	.01925
0.0	.96725	3.939	182.4329	1589.478	4.694	.01906
1.0	.96731	3.943	182.4412	1589.508	4.691	.01887
2.0	.96737	3.947	182.4495	1589.538	4.687	.01869
3.0	.96743	3.951	182.4578	1589.567	4.684	.01850
4.0	.96749	3.954	182.4661	1589.597	4.680	.01831
5.0	.96756	3.958	182.4744	1589.625	4.677	.01813
6.0	.96762	3.962	182.4827	1589.654	4.673	.01794
7.0	.96768	3.965	182.4910	1589.682	4.670	.01775
8.0	.96774	3.969	182.4993	1589.710	4.666	.01757
9.0	.96780	3.973	182.5077	1589.737	4.663	.01738
10.0	.96786	3.976	182.5160	1589.765	4.660	.01719

11.0	.96792	3.980	182.5243	1589.792	4.656	.01701
12.0	.96798	3.984	182.5326	1589.818	4.653	.01682
13.0	.96804	3.987	182.5410	1589.844	4.649	.01663
14.0	.96810	3.991	182.5493	1589.870	4.646	.01645
15.0	.96816	3.995	182.5577	1589.896	4.642	.01626
16.0	.96822	3.998	182.5660	1589.921	4.639	.01608
17.0	.96828	4.002	182.5744	1589.946	4.635	.01589
18.0	.96834	4.006	182.5828	1589.971	4.632	.01570
19.0	.96840	4.010	182.5911	1589.995	4.628	.01552
20.0	.96846	4.013	182.5995	1590.019	4.625	.01533
21.0	.96852	4.017	182.6079	1590.043	4.621	.01515
22.0	.96858	4.021	182.6162	1590.066	4.617	.01496
23.0	.96863	4.024	182.6246	1590.089	4.614	.01477
24.0	.96869	4.028	182.6330	1590.112	4.610	.01459
25.0	.96875	4.032	182.6414	1590.135	4.607	.01440
26.0	.96881	4.035	182.6498	1590.157	4.603	.01422
27.0	.96887	4.039	182.6582	1590.179	4.600	.01403
28.0	.96892	4.043	182.6666	1590.200	4.596	.01385
29.0	.96898	4.046	182.6750	1590.222	4.593	.01366
30.0	.96904	4.050	182.6834	1590.242	4.589	.01348
31.0	.96910	4.054	182.6918	1590.263	4.585	.01329
32.0	.96915	4.058	182.7003	1590.283	4.582	.01311
33.0	.96921	4.061	182.7087	1590.303	4.578	.01292
34.0	.96927	4.065	182.7171	1590.323	4.575	.01274
35.0	.96932	4.069	182.7255	1590.343	4.571	.01255
36.0	.96938	4.072	182.7340	1590.362	4.567	.01237
37.0	.96944	4.076	182.7424	1590.380	4.564	.01218
38.0	.96949	4.080	182.7509	1590.399	4.560	.01200
39.0	.96955	4.083	182.7593	1590.417	4.557	.01181
40.0	.96961	4.087	182.7678	1590.435	4.553	.01163
0.0	0.00000	0.000	.0001	.000	.001	.00001
0.0	0.00000	0.000	.0001	.000	.001	.00001

last 2 lines: max.|error| for range of DP/P0 = +-30E-3 and +-40E-3, resp.

END

Program KINACF
H.Koziol, July 1987

AC ANTIPROTON COLLECTOR : SOME PARAMETERS AS FUNCTION OF FREQUENCY
****

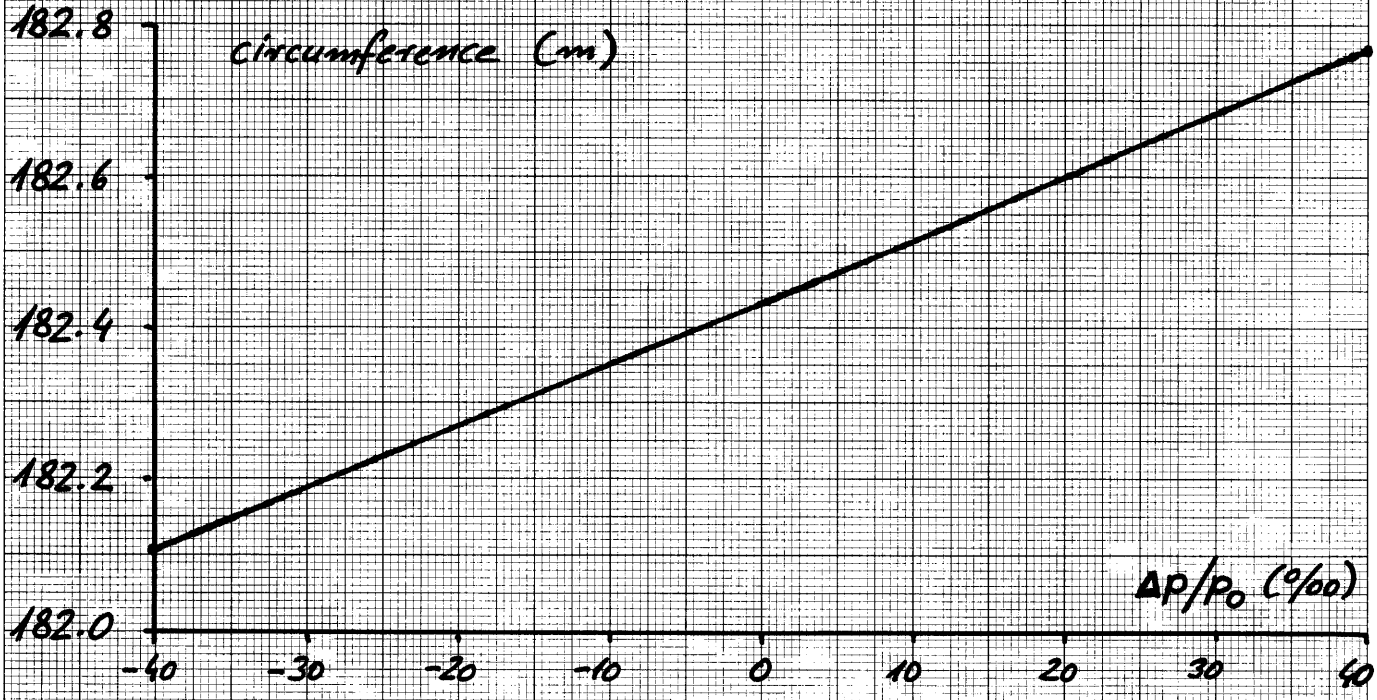
From polynomial fits to values from program ORBIT, print-out 30 June 1987.
Polynomials are in terms of DF = FREV - F0, where F0 = 1589.478 kHz
is the revolution frequency on central orbit.

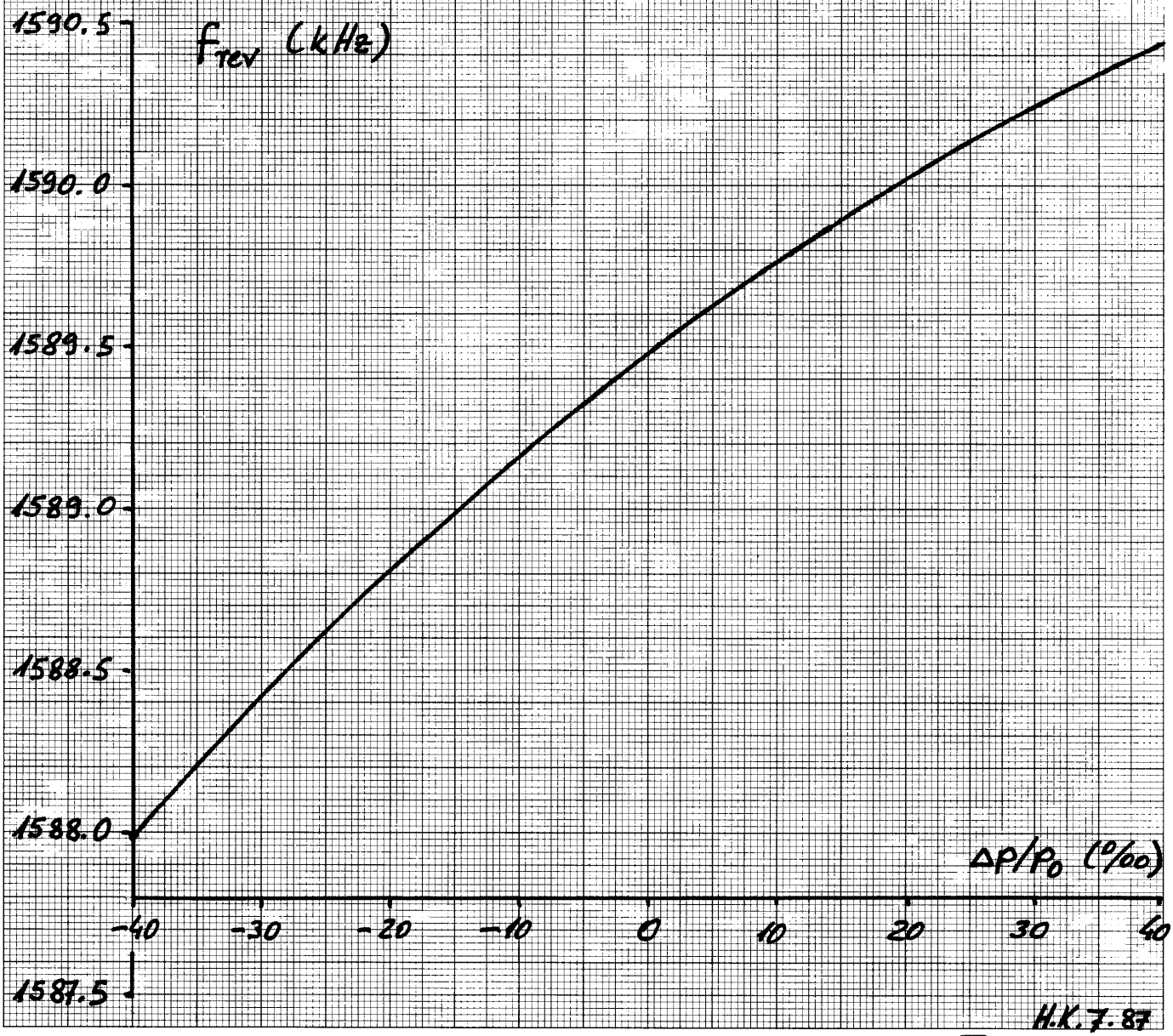
FREV kHz	DF kHz	DP/P0 E-3	GAMMATR	ETA
1588.000	-1.478	-39.81	4.827	.02667
1588.020	-1.458	-39.38	4.826	.02657
1588.040	-1.438	-38.94	4.824	.02648
1588.060	-1.418	-38.50	4.823	.02638
1588.080	-1.398	-38.06	4.821	.02628
1588.100	-1.378	-37.61	4.819	.02619
1588.120	-1.358	-37.16	4.818	.02609
1588.140	-1.338	-36.71	4.816	.02600
1588.160	-1.318	-36.25	4.814	.02590
1588.180	-1.298	-35.79	4.813	.02581
1588.200	-1.278	-35.33	4.811	.02571
1588.220	-1.258	-34.86	4.810	.02562
1588.240	-1.238	-34.39	4.808	.02552
1588.260	-1.218	-33.92	4.806	.02543
1588.280	-1.198	-33.44	4.805	.02533
1588.300	-1.178	-32.96	4.803	.02524
1588.320	-1.158	-32.48	4.802	.02514
1588.340	-1.138	-32.00	4.800	.02505
1588.360	-1.118	-31.51	4.798	.02495
1588.380	-1.098	-31.02	4.797	.02486
1588.400	-1.078	-30.53	4.795	.02476
1588.420	-1.058	-30.03	4.793	.02467
1588.440	-1.038	-29.53	4.792	.02457
1588.460	-1.018	-29.03	4.790	.02448
1588.480	-.998	-28.53	4.789	.02438
1588.500	-.978	-28.02	4.787	.02428
1588.520	-.958	-27.52	4.785	.02419
1588.540	-.938	-27.00	4.784	.02409
1588.560	-.918	-26.49	4.782	.02400
1588.580	-.898	-25.98	4.780	.02390
1588.600	-.878	-25.46	4.779	.02380
1588.620	-.858	-24.94	4.777	.02370
1588.640	-.838	-24.41	4.775	.02361
1588.660	-.818	-23.89	4.774	.02351
1588.680	-.798	-23.36	4.772	.02341
1588.700	-.778	-22.83	4.770	.02331
1588.720	-.758	-22.30	4.768	.02321
1588.740	-.738	-21.76	4.767	.02311
1588.760	-.718	-21.22	4.765	.02302
1588.780	-.698	-20.68	4.763	.02292
1588.800	-.678	-20.14	4.761	.02281
1588.820	-.658	-19.60	4.760	.02271
1588.840	-.638	-19.05	4.758	.02261
1588.860	-.618	-18.50	4.756	.02251
1588.880	-.598	-17.95	4.754	.02241
1588.900	-.578	-17.39	4.752	.02231
1588.920	-.558	-16.83	4.751	.02220
1588.940	-.538	-16.27	4.749	.02210
1588.960	-.518	-15.71	4.747	.02200
1588.980	-.498	-15.15	4.745	.02189
1589.000	-.478	-14.58	4.743	.02179
1589.020	-.458	-14.01	4.741	.02168
1589.040	-.438	-13.43	4.739	.02157
1589.060	-.418	-12.85	4.738	.02147
1589.080	-.398	-12.27	4.736	.02136

1589.100	-.378	-11.69	4.734	.02125
1589.120	-.358	-11.10	4.732	.02114
1589.140	-.338	-10.52	4.730	.02103
1589.160	-.318	-9.92	4.728	.02092
1589.180	-.298	-9.33	4.726	.02081
1589.200	-.278	-8.73	4.724	.02070
1589.220	-.258	-8.13	4.722	.02059
1589.240	-.238	-7.52	4.720	.02047
1589.260	-.218	-6.91	4.718	.02036
1589.280	-.198	-6.30	4.716	.02024
1589.300	-.178	-5.68	4.714	.02013
1589.320	-.158	-5.06	4.711	.02001
1589.340	-.138	-4.43	4.709	.01989
1589.360	-.118	-3.80	4.707	.01978
1589.380	-.098	-3.17	4.705	.01966
1589.400	-.078	-2.53	4.703	.01954
1589.420	-.058	-1.89	4.701	.01942
1589.440	-.038	-1.24	4.698	.01929
1589.460	-.018	-.59	4.696	.01917
1589.480	.002	.07	4.694	.01905
1589.500	.022	.73	4.691	.01892
1589.520	.042	1.39	4.689	.01880
1589.540	.062	2.06	4.687	.01867
1589.560	.082	2.74	4.684	.01854
1589.580	.102	3.42	4.682	.01841
1589.600	.122	4.11	4.680	.01829
1589.620	.142	4.80	4.677	.01815
1589.640	.162	5.50	4.675	.01802
1589.660	.182	6.20	4.672	.01789
1589.680	.202	6.91	4.670	.01776
1589.700	.222	7.63	4.667	.01762
1589.720	.242	8.35	4.665	.01748
1589.740	.262	9.08	4.662	.01735
1589.760	.282	9.82	4.660	.01721
1589.780	.302	10.56	4.657	.01707
1589.800	.322	11.31	4.654	.01693
1589.820	.342	12.07	4.652	.01679
1589.840	.362	12.83	4.649	.01664
1589.860	.382	13.61	4.646	.01650
1589.880	.402	14.39	4.644	.01635
1589.900	.422	15.17	4.641	.01621
1589.920	.442	15.97	4.638	.01606
1589.940	.462	16.77	4.635	.01591
1589.960	.482	17.58	4.632	.01576
1589.980	.502	18.41	4.629	.01560
1590.000	.522	19.24	4.626	.01545
1590.020	.542	20.07	4.623	.01529
1590.040	.562	20.92	4.620	.01514
1590.060	.582	21.78	4.617	.01498
1590.080	.602	22.64	4.614	.01482
1590.100	.622	23.52	4.611	.01466
1590.120	.642	24.41	4.608	.01450
1590.140	.662	25.30	4.605	.01433
1590.160	.682	26.21	4.602	.01417
1590.180	.702	27.13	4.599	.01400
1590.200	.722	28.06	4.596	.01383
1590.220	.742	29.00	4.592	.01366
1590.240	.762	29.95	4.589	.01349
1590.260	.782	30.91	4.586	.01332
1590.280	.802	31.89	4.582	.01315
1590.300	.822	32.87	4.579	.01297
1590.320	.842	33.87	4.575	.01279
1590.340	.862	34.88	4.572	.01261
1590.360	.882	35.91	4.568	.01243
1590.380	.902	36.94	4.565	.01225
1590.400	.922	37.99	4.561	.01206
0.000	0.000	.07	.001	.00004
0.000	0.000	.11	.002	.00010

last 2 lines: max.|error| for range of DP/P0 = +-30E-3 and +-40E-3, resp.

AC ANTIPROTON COLLECTOR

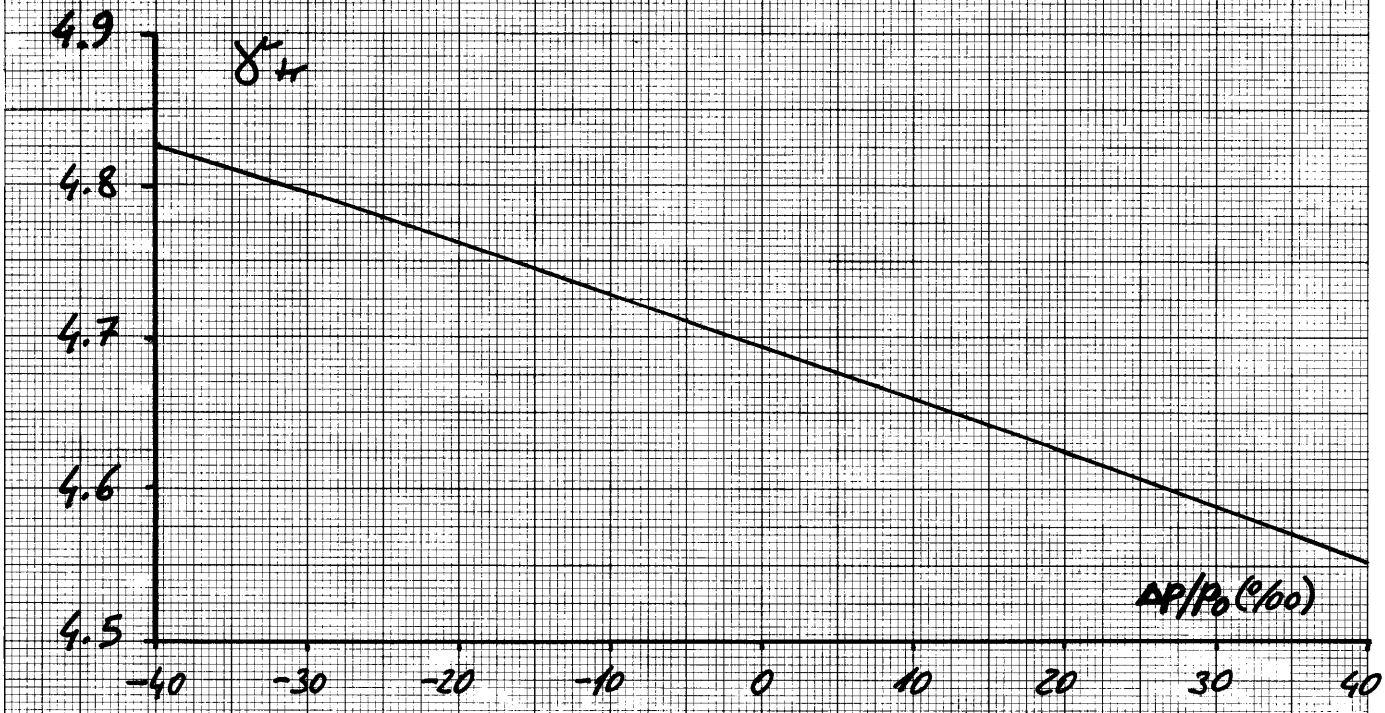


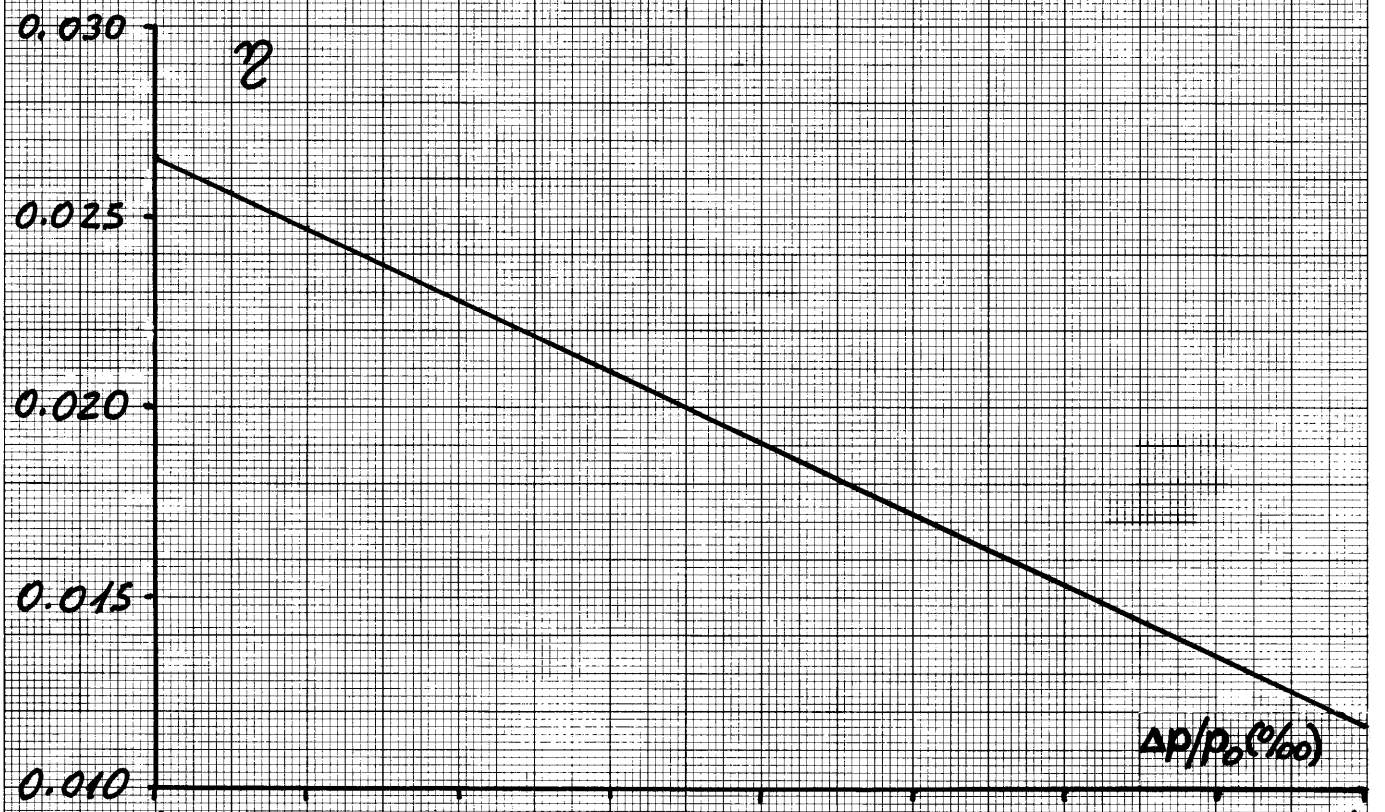


H.K. 7.87

ael ærni-leuch ag, 3097 liebefeld-bern

AC ANTIPROTON COLLECTOR

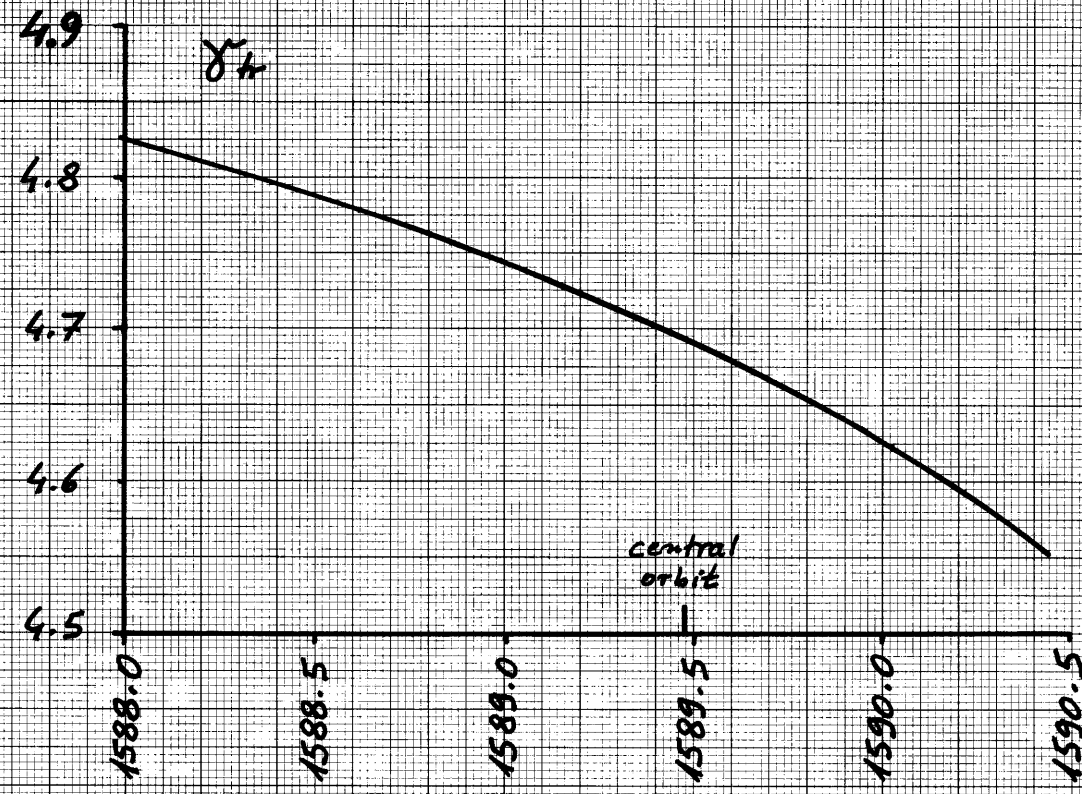


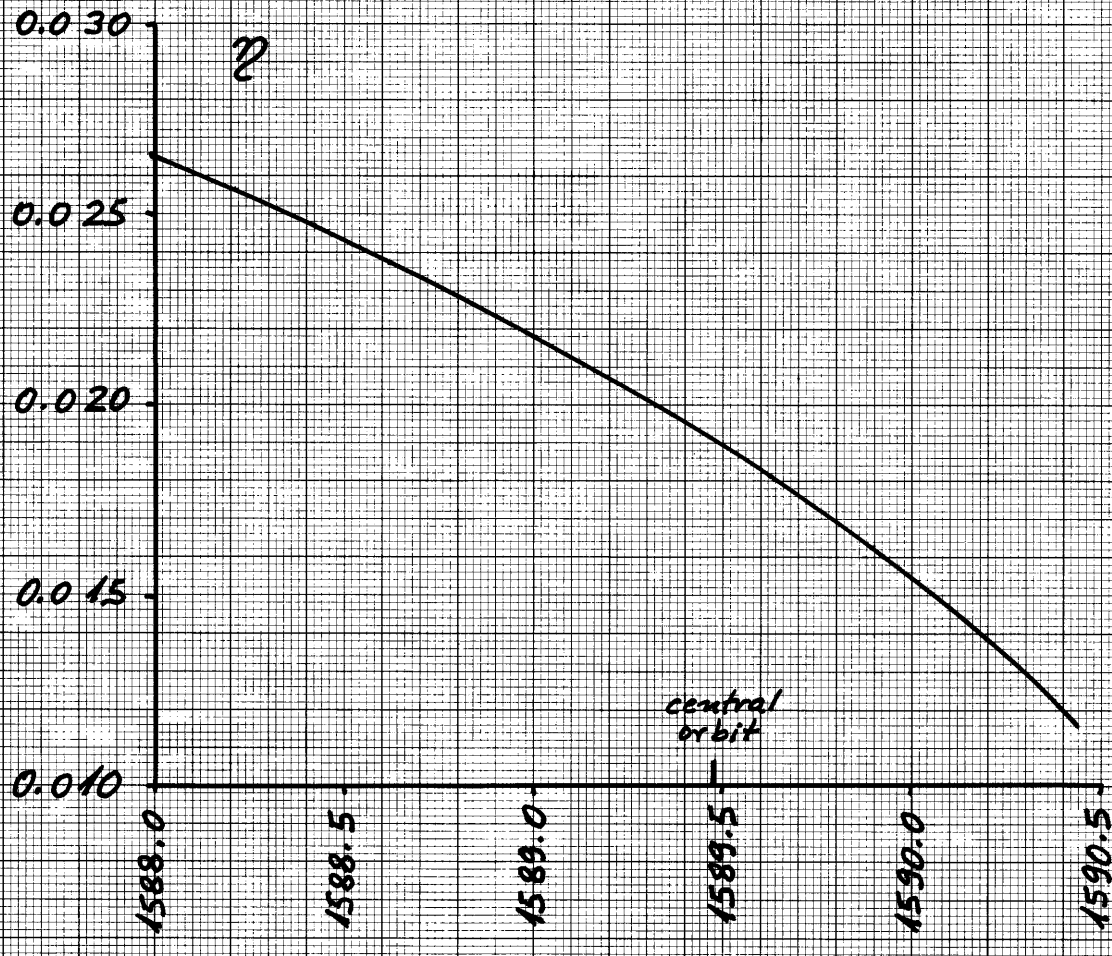


H.K. 7.87

ael ærni-leuch ag, 3097 liebefeld-bern

AC ANTIPROTON COLLECTOR





H.K. 7.87

ærni-leuch ag, 3097 liebefeld-bern

AA ANTIPROTON ACCUMULATOR

Kinematic parameters expressed as polynomials $y = a_0 + a_1 x + a_2 x^2 + a_3 x^3 + a_4 x^4$

	a_0	a_1	a_2	a_3	a_4	max. abs. error range of $\Delta p/p_0$	
$x = \Delta p/p_0$ (‰)		$(\Delta p/p_0)$	$(\Delta p/p_0)^2$	$(\Delta p/p_0)^3$	$(\Delta p/p_0)^4$	± 30‰	± 40‰
circumference (m) =	156.4924	$+2.705 * 10^{-2}$	$+1.802 * 10^{-5}$	$+5.4 * 10^{-8}$	0	0.0001	0.0001
f_{rev} (kHz) =	1850.364	$-1.9576 * 10^{-1}$	$-3.52 * 10^{-4}$	$-3.5 * 10^{-7}$	0	0.001	0.003
γ_{tr} =	2.405	$-2.6 * 10^{-3}$	$-3.6 * 10^{-6}$	0	0	0.0005	0.0006
η =	−0.1058	$-5.05 * 10^{-4}$	$-1.2 * 10^{-6}$	0	0	0.0003	0.0003
$x = \Delta f$ (kHz)	$\Delta f = f_{rev} - f_0$, $f_0 = 1850.364$	(Δf)	$(\Delta f)^2$	$(\Delta f)^3$	$(\Delta f)^4$		
$\Delta p/p_0$ (‰) =	0	$-5.108 * 10^{0}$	$-4.75 * 10^{-2}$	$-6.3 * 10^{-4}$	0	0.01	0.02
γ_{tr} =	2.405	$+1.33 * 10^{-2}$	$+2.5 * 10^{-5}$	0	0	0.0006	0.0006
η =	−0.1058	$+2.56 * 10^{-3}$	$-3 * 10^{-6}$	0	0	0.0001	0.0001

H.K. 7.87

Program KINAAP
H.Koziol, July 1987

AA ANTIPROTON ACCUMULATOR : SOME PARAMETERS AS FUNCTION OF MOMENTUM
****

E0 = 938.2796 MeV proton rest mass
P0 = 3500 MeV/c central orbit momentum

BETA, GAMMA : calculated from DP/P0, using P0 and E0

CIRCUMF, FREV : from polynomial fits to values from program
GAMMATR, ETA : ORBIT, print-out of 2 June 1987

DP/P0 E-3	BETA	GAMMA	CIRCUMF m	FREV kHz	GAMMATR	ETA
-40.0	.96315	3.718	155.4358	1857.654	2.503	-.0875
-39.0	.96322	3.722	155.4617	1857.484	2.501	-.0879
-38.0	.96330	3.725	155.4876	1857.314	2.499	-.0883
-37.0	.96337	3.729	155.5135	1857.143	2.496	-.0888
-36.0	.96344	3.732	155.5394	1856.971	2.494	-.0892
-35.0	.96351	3.736	155.5654	1856.799	2.492	-.0896
-34.0	.96358	3.740	155.5914	1856.627	2.489	-.0900
-33.0	.96365	3.743	155.6174	1856.453	2.487	-.0904
-32.0	.96373	3.747	155.6435	1856.279	2.485	-.0909
-31.0	.96380	3.750	155.6696	1856.105	2.482	-.0913
-30.0	.96387	3.754	155.6957	1855.929	2.480	-.0917
-29.0	.96394	3.758	155.7218	1855.754	2.477	-.0922
-28.0	.96401	3.761	155.7479	1855.577	2.475	-.0926
-27.0	.96408	3.765	155.7741	1855.400	2.473	-.0930
-26.0	.96415	3.768	155.8003	1855.222	2.470	-.0935
-25.0	.96422	3.772	155.8266	1855.043	2.468	-.0939
-24.0	.96429	3.776	155.8528	1854.864	2.465	-.0944
-23.0	.96436	3.779	155.8791	1854.685	2.463	-.0948
-22.0	.96442	3.783	155.9054	1854.504	2.460	-.0953
-21.0	.96449	3.786	155.9318	1854.323	2.458	-.0957
-20.0	.96456	3.790	155.9582	1854.141	2.456	-.0962
-19.0	.96463	3.794	155.9846	1853.959	2.453	-.0966
-18.0	.96470	3.797	156.0110	1853.776	2.451	-.0971
-17.0	.96477	3.801	156.0375	1853.592	2.448	-.0976
-16.0	.96483	3.804	156.0640	1853.407	2.446	-.0980
-15.0	.96490	3.808	156.0905	1853.222	2.443	-.0985
-14.0	.96497	3.812	156.1171	1853.037	2.441	-.0990
-13.0	.96504	3.815	156.1437	1852.850	2.438	-.0994
-12.0	.96510	3.819	156.1703	1852.663	2.436	-.0999
-11.0	.96517	3.822	156.1970	1852.475	2.433	-.1004
-10.0	.96524	3.826	156.2236	1852.287	2.431	-.1009
-9.0	.96530	3.830	156.2504	1852.098	2.428	-.1014
-8.0	.96537	3.833	156.2771	1851.908	2.426	-.1018
-7.0	.96544	3.837	156.3039	1851.717	2.423	-.1023
-6.0	.96550	3.840	156.3307	1851.526	2.420	-.1028
-5.0	.96557	3.844	156.3576	1851.334	2.418	-.1033
-4.0	.96563	3.848	156.3845	1851.141	2.415	-.1038
-3.0	.96570	3.851	156.4114	1850.948	2.413	-.1043
-2.0	.96576	3.855	156.4384	1850.754	2.410	-.1048
-1.0	.96583	3.858	156.4654	1850.559	2.408	-.1053
0.0	.96589	3.862	156.4924	1850.364	2.405	-.1058
1.0	.96596	3.866	156.5195	1850.168	2.402	-.1063
2.0	.96602	3.869	156.5466	1849.971	2.400	-.1068
3.0	.96609	3.873	156.5737	1849.774	2.397	-.1073
4.0	.96615	3.876	156.6009	1849.575	2.395	-.1078
5.0	.96622	3.880	156.6281	1849.376	2.392	-.1084
6.0	.96628	3.884	156.6554	1849.177	2.389	-.1089
7.0	.96634	3.887	156.6827	1848.976	2.387	-.1094
8.0	.96641	3.891	156.7100	1848.775	2.384	-.1099
9.0	.96647	3.894	156.7373	1848.573	2.381	-.1104
10.0	.96653	3.898	156.7648	1848.371	2.379	-.1110

11.0	.96660	3.902	156.7922	1848.168	2.376	-.1115
12.0	.96666	3.905	156.8197	1847.964	2.373	-.1120
13.0	.96672	3.909	156.8472	1847.759	2.371	-.1126
14.0	.96678	3.912	156.8748	1847.553	2.368	-.1131
15.0	.96685	3.916	156.9024	1847.347	2.365	-.1136
16.0	.96691	3.920	156.9300	1847.140	2.362	-.1142
17.0	.96697	3.923	156.9577	1846.933	2.360	-.1147
18.0	.96703	3.927	156.9855	1846.724	2.357	-.1153
19.0	.96709	3.930	157.0132	1846.515	2.354	-.1158
20.0	.96715	3.934	157.0410	1846.305	2.352	-.1164
21.0	.96722	3.938	157.0689	1846.095	2.349	-.1169
22.0	.96728	3.941	157.0968	1845.883	2.346	-.1175
23.0	.96734	3.945	157.1247	1845.671	2.343	-.1180
24.0	.96740	3.948	157.1527	1845.458	2.341	-.1186
25.0	.96746	3.952	157.1808	1845.245	2.338	-.1192
26.0	.96752	3.956	157.2088	1845.030	2.335	-.1197
27.0	.96758	3.959	157.2369	1844.815	2.332	-.1203
28.0	.96764	3.963	157.2651	1844.599	2.329	-.1209
29.0	.96770	3.967	157.2933	1844.382	2.327	-.1215
30.0	.96776	3.970	157.3216	1844.165	2.324	-.1220
31.0	.96782	3.974	157.3499	1843.947	2.321	-.1226
32.0	.96788	3.977	157.3782	1843.728	2.318	-.1232
33.0	.96794	3.981	157.4066	1843.508	2.315	-.1238
34.0	.96800	3.985	157.4351	1843.287	2.312	-.1244
35.0	.96805	3.988	157.4635	1843.066	2.310	-.1249
36.0	.96811	3.992	157.4921	1842.844	2.307	-.1255
37.0	.96817	3.995	157.5207	1842.621	2.304	-.1261
38.0	.96823	3.999	157.5493	1842.398	2.301	-.1267
39.0	.96829	4.003	157.5780	1842.173	2.298	-.1273
40.0	.96835	4.006	157.6067	1841.948	2.295	-.1279
0.0	0.00000	0.000	.0001	.001	0.000	.0003
0.0	0.00000	0.000	.0001	.003	.001	.0003

last 2 lines: max.|error| for range of DP/P0 = +-30E-3 and +-40E-3, resp.

END

Program KINAAF
H.Koziol, July 1987

AA ANTIPROTON ACCUMULATOR : SOME PARAMETERS AS FUNCTION OF FREQUENCY
****

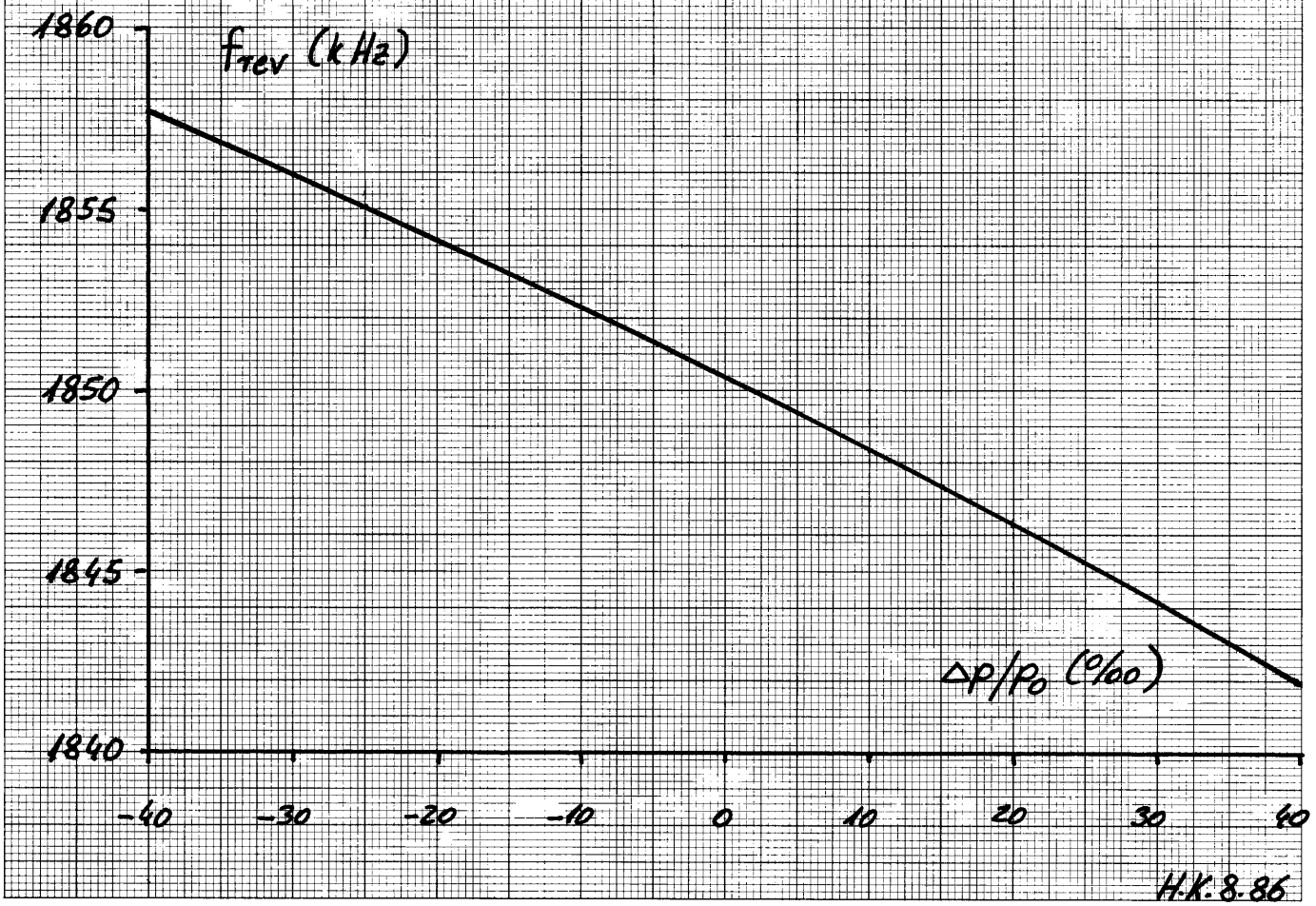
From polynomial fits to values from program ORBIT, print-out 2 June 1987.
Polynomials are in terms of DF = FREV - F0, where F0 = 1850.364 kHz
is the revolution frequency on central orbit.

FREV kHz	DF kHz	DP/P0 E-3	GAMMATR	ETA
1842.0	-8.364	39.77	2.296	-.1274
1842.2	-8.164	38.88	2.298	-.1269
1842.4	-7.964	37.99	2.301	-.1264
1842.6	-7.764	37.09	2.303	-.1259
1842.8	-7.564	36.19	2.306	-.1253
1843.0	-7.364	35.29	2.308	-.1248
1843.2	-7.164	34.39	2.311	-.1243
1843.4	-6.964	33.48	2.314	-.1238
1843.6	-6.764	32.57	2.316	-.1233
1843.8	-6.564	31.66	2.319	-.1227
1844.0	-6.364	30.75	2.321	-.1222
1844.2	-6.164	29.83	2.324	-.1217
1844.4	-5.964	28.91	2.327	-.1212
1844.6	-5.764	27.99	2.329	-.1207
1844.8	-5.564	27.06	2.332	-.1201
1845.0	-5.364	26.13	2.334	-.1196
1845.2	-5.164	25.20	2.337	-.1191
1845.4	-4.964	24.26	2.340	-.1186
1845.6	-4.764	23.32	2.342	-.1181
1845.8	-4.564	22.38	2.345	-.1175
1846.0	-4.364	21.44	2.347	-.1170
1846.2	-4.164	20.49	2.350	-.1165
1846.4	-3.964	19.54	2.353	-.1160
1846.6	-3.764	18.59	2.355	-.1155
1846.8	-3.564	17.63	2.358	-.1150
1847.0	-3.364	16.67	2.361	-.1144
1847.2	-3.164	15.71	2.363	-.1139
1847.4	-2.964	14.74	2.366	-.1134
1847.6	-2.764	13.77	2.368	-.1129
1847.8	-2.564	12.80	2.371	-.1124
1848.0	-2.364	11.82	2.374	-.1119
1848.2	-2.164	10.84	2.376	-.1114
1848.4	-1.964	9.85	2.379	-.1108
1848.6	-1.764	8.87	2.382	-.1103
1848.8	-1.564	7.88	2.384	-.1098
1849.0	-1.364	6.88	2.387	-.1093
1849.2	-1.164	5.88	2.390	-.1088
1849.4	-.964	4.88	2.392	-.1083
1849.6	-.764	3.88	2.395	-.1078
1849.8	-.564	2.87	2.398	-.1072
1850.0	-.364	1.85	2.400	-.1067
1850.2	-.164	.84	2.403	-.1062
1850.4	.036	-.18	2.405	-.1057
1850.6	.236	-1.21	2.408	-.1052
1850.8	.436	-2.24	2.411	-.1047
1851.0	.636	-3.27	2.413	-.1042
1851.2	.836	-4.30	2.416	-.1037
1851.4	1.036	-5.34	2.419	-.1032
1851.6	1.236	-6.39	2.421	-.1026
1851.8	1.436	-7.43	2.424	-.1021
1852.0	1.636	-8.49	2.427	-.1016
1852.2	1.836	-9.54	2.430	-.1011
1852.4	2.036	-10.60	2.432	-.1006
1852.6	2.236	-11.67	2.435	-.1001
1852.8	2.436	-12.73	2.438	-.0996

1853.0	2.636	-13.81	2.440	-.0991
1853.2	2.836	-14.88	2.443	-.0986
1853.4	3.036	-15.96	2.446	-.0981
1853.6	3.236	-17.05	2.448	-.0975
1853.8	3.436	-18.14	2.451	-.0970
1854.0	3.636	-19.23	2.454	-.0965
1854.2	3.836	-20.33	2.456	-.0960
1854.4	4.036	-21.43	2.459	-.0955
1854.6	4.236	-22.54	2.462	-.0950
1854.8	4.436	-23.65	2.464	-.0945
1855.0	4.636	-24.76	2.467	-.0940
1855.2	4.836	-25.88	2.470	-.0935
1855.4	5.036	-27.01	2.473	-.0930
1855.6	5.236	-28.14	2.475	-.0925
1855.8	5.436	-29.27	2.478	-.0920
1856.0	5.636	-30.41	2.481	-.0915
1856.2	5.836	-31.55	2.483	-.0910
1856.4	6.036	-32.70	2.486	-.0905
1856.6	6.236	-33.85	2.489	-.0900
1856.8	6.436	-35.01	2.492	-.0894
1857.0	6.636	-36.17	2.494	-.0889
1857.2	6.836	-37.34	2.497	-.0884
1857.4	7.036	-38.51	2.500	-.0879
1857.6	7.236	-39.69	2.503	-.0874
0.0	0.000	.01	.001	.0001
0.0	0.000	.02	.001	.0001

last 2 lines: max.|error| for range of DP/P0 = +-30E-3 and +-40E-3, resp.

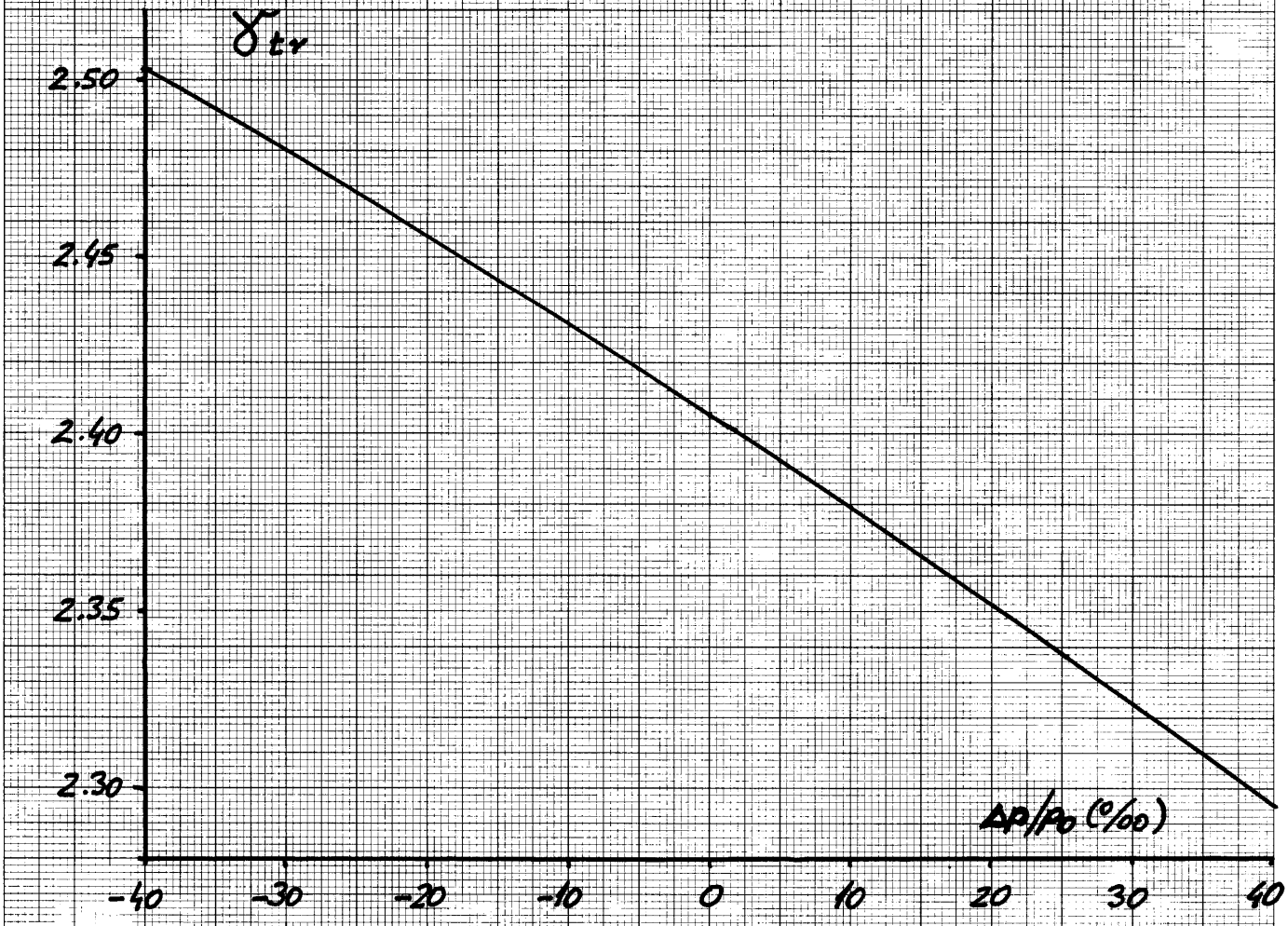
END

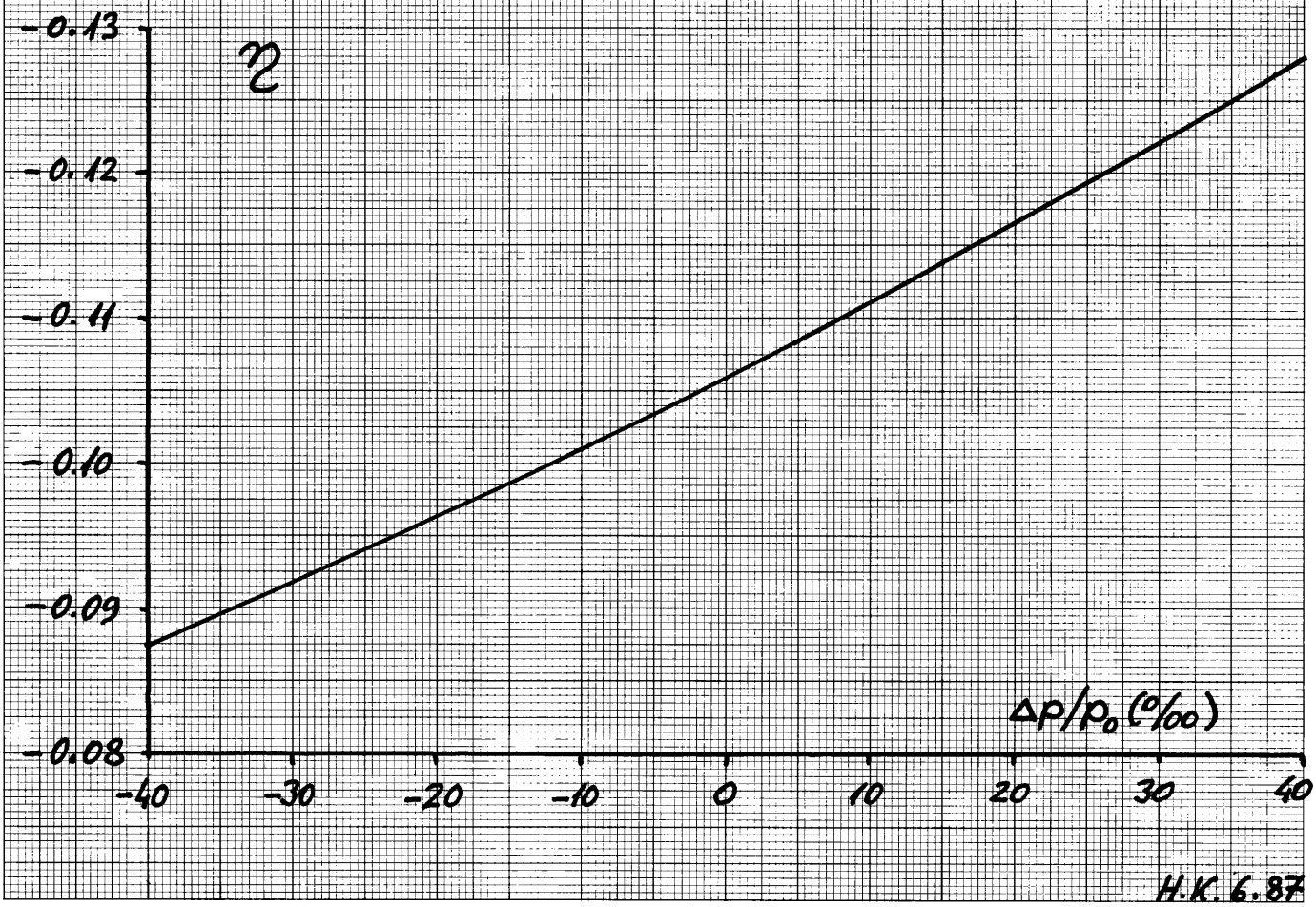


H.K. 8.86

ærni-leuch ag, 3097 liebefeld-bern

AA ANTIPROTON ACCUMULATOR

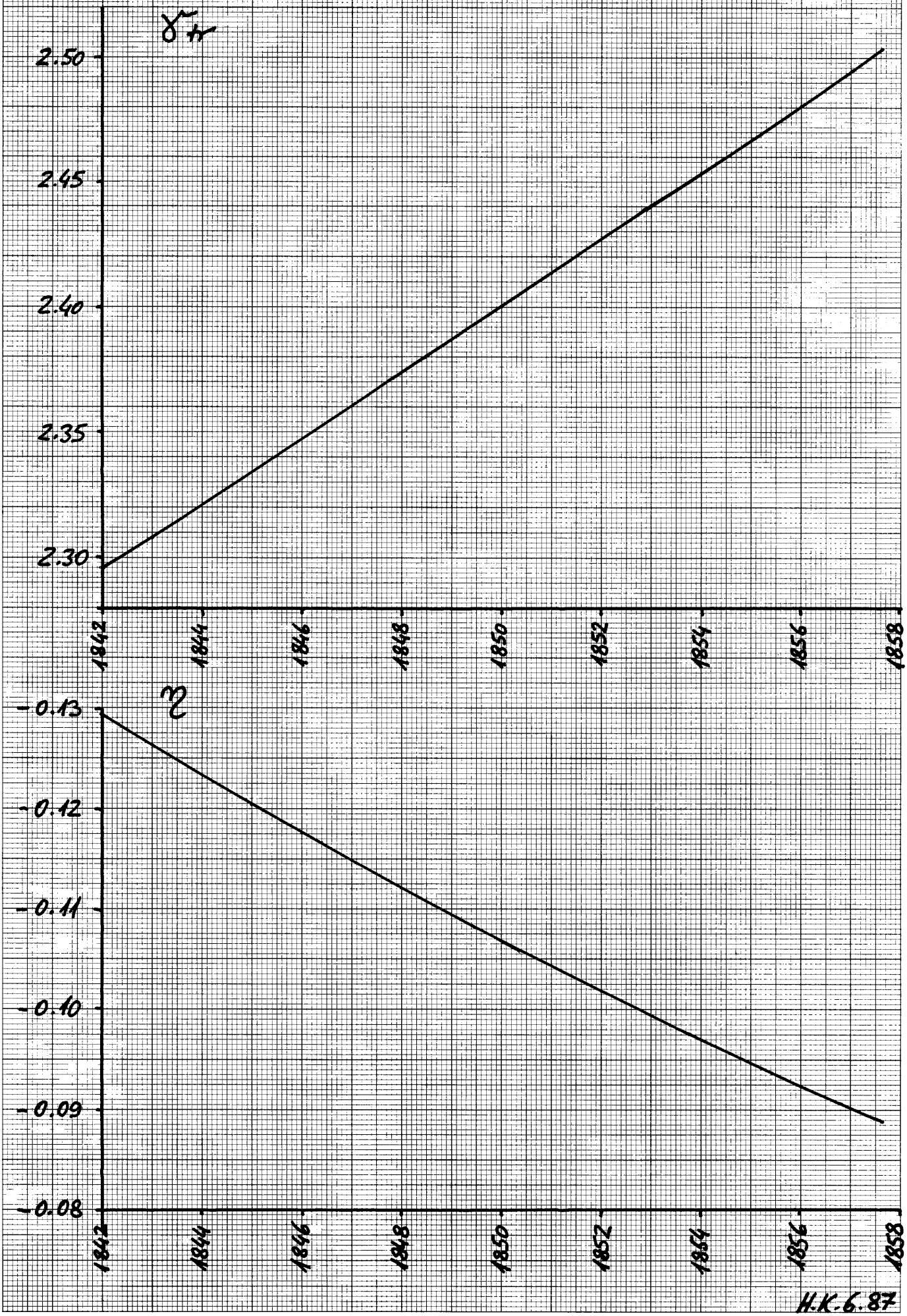




H.K. 6.87

ærni-leuch ag, 3097 liebefeld-bern

AA ANTIPROTON ACCUMULATOR



H.K. 6.87

ærni-leuch ag, 3097 liebefeld-bern