Cas A Calibration

QMAP Flight 1, 16Jun96

th, 10apr98

- beam pairs are now combined for width fit
- Q3 fit is constrained by Q4
- center frequencies and errors from Amber's bandpass measurements
- 1998 Cas A fit with eml
- fractional instead of linear decrease model
- errors include frequency uncertainty
- error version including systematic error estimate in the integral

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Cas A	a	5.7128 ± 0.023
	b	-0.759 ± 0.006
	d	0.97 ± 0.040
	e	-0.3 ± 0.040
	epoch	1980

Observing Epoch	1996.45	
time difference	16.45	years

Constants	c	2.998E+10	cm/s
	k	1.380E-16	erg/K
	flux	1.000E-23	cgs/Jy
	ln10	2.3025851	
	deg -> rad	0.0174533	rad/°
	FWHM -> s	0.4246609	

Channel	ν	σν	Flux Density of Cas A (fit 1998) Se	D	S in flight (Jy)			α
Ka1	31.2E+09	8.30E+08	200.2	0.9948	183.7 ± 16.1	8.8%	note:	-0.737
Ka2	30.5E+09	3.20E+08	203.9	0.9948	187.0 ± 16.0	8.6%	flux error includes	-0.737
Q1	41.7E+09	4.50E+08	160.8	0.9952	148.5 ± 13.0	8.7%	frequency error	-0.737
Q2	41.1E+09	4.10E+08	162.4	0.9951	149.9 ± 13.1	8.7%		-0.737
Q3	42.3E+09	4.10E+08	159.1	0.9952	147.0 ± 12.8	8.7%		-0.737
Q4	41.3E+09	4.90E+08	162.0	0.9951	149.5 ± 13.1	8.7%		

	Beam FWHM major axis (°)	FWHM minor axis (°)	Omega (ster)	
Ka1	0.931 ± 0.007	0.882 ± 0.006	2.83E-04 ± 2.94E-06	1.0%
Ka2	0.931 ± 0.007	0.882 ± 0.006	2.83E-04 ± 2.94E-06	1.0%
Q1	0.694 ± 0.008	0.658 ± 0.008	1.58E-04 ± 2.64E-06	1.7%
Q2	0.694 ± 0.008	0.658 ± 0.008	1.58E-04 ± 2.64E-06	1.7%
Q3	0.700 ± 0.016	0.668 ± 0.014	1.62E-04 ± 4.94E-06	3.1%
Q4	0.700 ± 0.016	0.668 ± 0.014	1.62E-04 ± 4.94E-06	3.1%

	predicted Tsky of Cas A T (K)		errors without Cas A	ν
Ka1	0.0217 ± 0.0024	11.3%	± 0.0016	± 0.0002
Ka2	0.0231 ± 0.0021	9.1%	± 0.0007	± 0.0002
Q1	0.0177 ± 0.0016	9.3%	± 0.0006	± 0.0003
Q2	0.0183 ± 0.0017	9.3%	± 0.0006	± 0.0003
Q3	0.0166 ± 0.0016	9.6%	± 0.0007	± 0.0005
Q4	0.0177 ± 0.0017	9.8%	± 0.0008	± 0.0005

	calibration spikes		(using f2)					
	a0	a1	a2	a3	a4	frame	f2	CAL
Ka1	4251.5	237.08	0.014613	-11.361	-7.6097	38750	0.8750	4446.9
Ka2	2747.5	160.67	11.178	-15.022	-3.5627	38750	0.8750	2884.5
Q1	1173.6	66.529	-12.744	-10.809	3.2977	38750	0.8750	1216.7
Q2	1205.1	41.128	-26.058	-7.0562	5.3677	38750	0.8750	1219.6
Q3	31.502	0.17885	0.92088	0.28045	-0.23034	37300	0.7300	32.2
Q4	1067.9	54.897	-6.3817	-6.3295	-0.06337	37300	0.7300	1102.1

	measured flux density of Cas A			**syst. integral error**	
	P (counts)	P (CAL)		fractional	sigma_I'
Ka1	267.9 ± 2.0	0.0602 ± 0.0004	0.7%	0.07	1.19E-06
Ka2	237.3 ± 1.6	0.0823 ± 0.0006	0.7%	0.07	1.63E-06
Q1	137.8 ± 1.6	0.1132 ± 0.0013	1.2%	0.06	1.07E-06
Q2	144.1 ± 1.9	0.1182 ± 0.0016	1.3%	0.06	1.12E-06
Q3	4.6 ± 0.2	0.1434 ± 0.0060	4.2%	0.12	2.78E-06
Q4	177.8 ± 3.6	0.1613 ± 0.0033	2.0%	0.05	1.30E-06

	Calibration		errors without		
	K/CAL		Cas A	ν	
Ka1	**0.360 ± 0.041**	11.3%	± 0.027	± 0.005	errors include only
Ka2	**0.281 ± 0.026**	9.1%	± 0.009	± 0.004	formal errors on beam
Q1	**0.156 ± 0.015**	9.4%	± 0.006	± 0.003	
Q2	**0.155 ± 0.014**	9.4%	± 0.005	± 0.003	
Q3	**0.116 ± 0.012**	10.5%	± 0.007	± 0.006	
Q4	**0.110 ± 0.011**	10.0%	± 0.005	± 0.004	

Ka1	**0.360 ± 0.048**	13.2%	± 0.036	± 0.025	errors include estimate
Ka2	**0.281 ± 0.032**	11.4%	± 0.021	± 0.020	of the systematic error
Q1	**0.156 ± 0.017**	11.0%	± 0.010	± 0.009	in the beam integral
Q2	**0.155 ± 0.017**	10.9%	± 0.010	± 0.009	instead of formal errors
Q3	**0.116 ± 0.017**	15.1%	± 0.014	± 0.014	
Q4	**0.110 ± 0.012**	10.5%	± 0.007	± 0.005	