

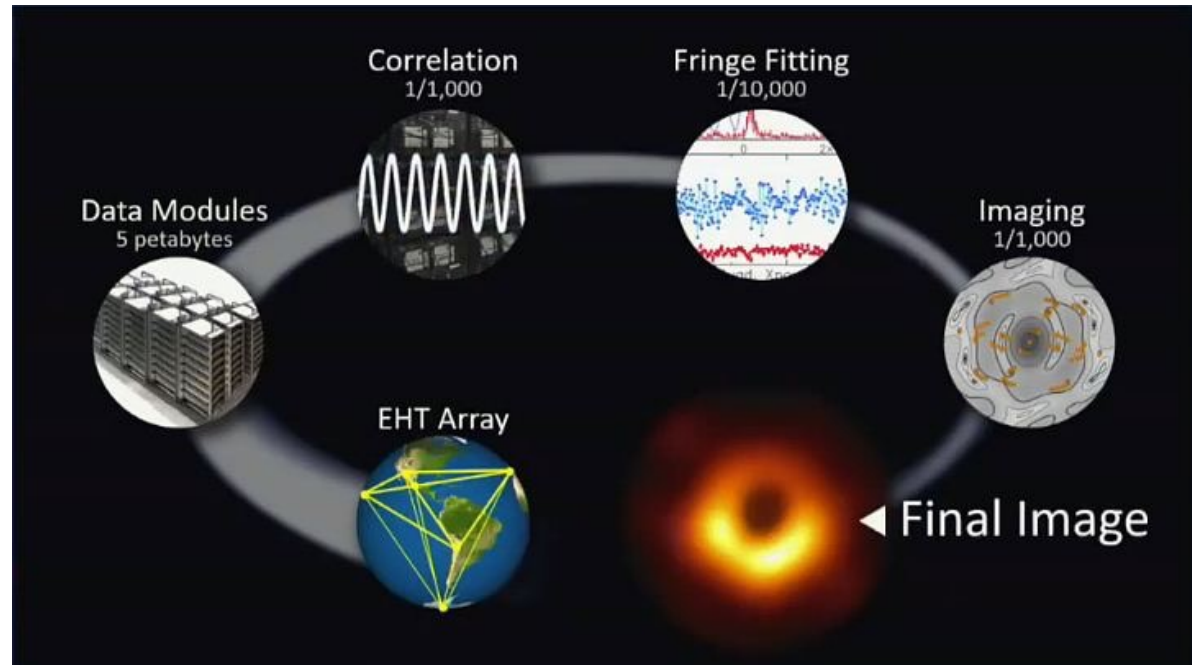
Antenna Gain Calibration



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Why is calibration important?

Astronomy



IVS

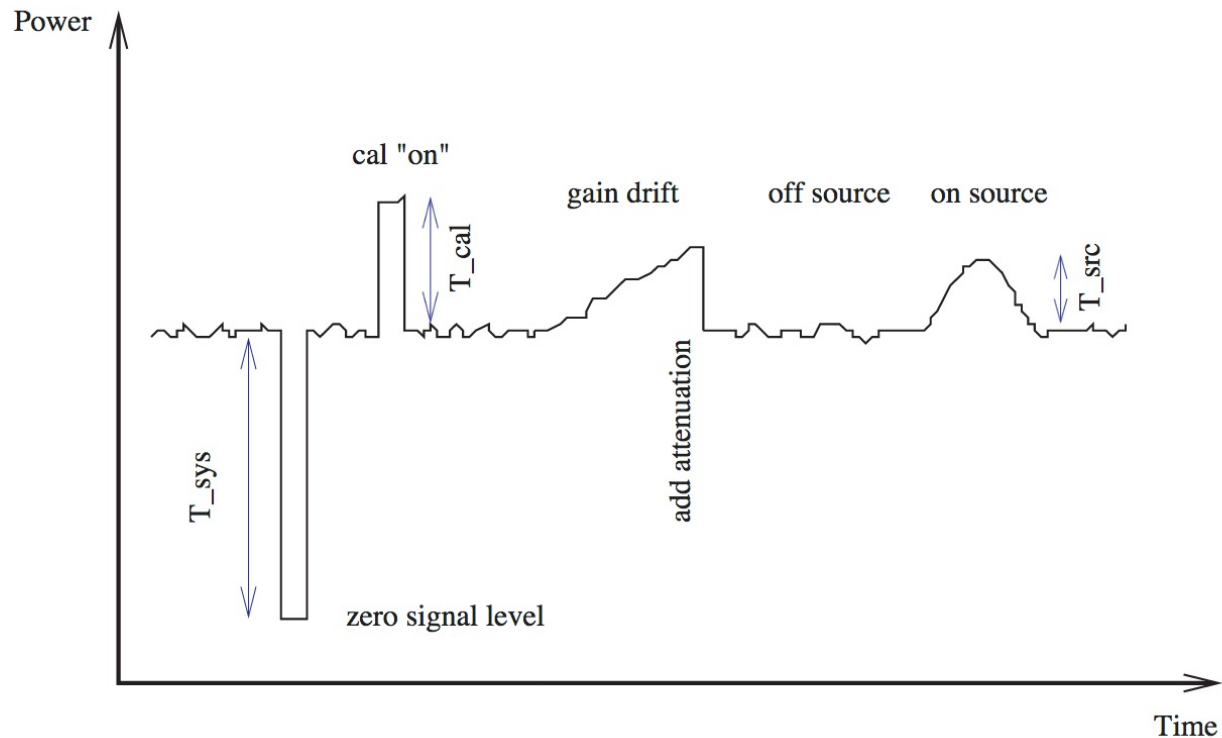
Reach the VGOS goals! Source structure etc.

Seminar: Station Amplitude Calibration (Eskil Varenius)

<https://vlbi.org/2021/04/12/seminar-stations-amplitude-calibration/>

How can we deliver better calibrated data to the user/IVS?

- fivept (pointing)
- onoff (determine: noise diode and gain curve)
- gnplt (analyse result from onoff)



Important files

- fluxctl /usr2/control
- *.rxg /usr2/control/rxg_files

ONOFF

- Power on source [ONSO]
- Power on source with noise diode on [ONSC]
- Power off source with noise diode on [OFFC]
- Power off source with noise diode off [OFFS]
- Power off source with no signal for "zero" [ZERO]

onoff=2,2,,,,,all onoff=2,2,,,,,057u

ACQUIR = Run many ONOFFs in sequence

2011.067.07:43:29.45#onoff#	source	Az	El	De	I	P	Center	Comp	Tsys	SEFD	Tcal(j)	Tcal(r)
2011.067.07:43:29.45#onoff#VAL	cygnusa	161.7	72.8	1u	1	l	4941.00	0.9850	57.62	736.3	193.744	1.05
2011.067.07:43:29.45#onoff#VAL	cygnusa	161.7	72.8	2u	2	r	4941.00	0.9878	169.9	844.2	77.882	0.41
2011.067.07:43:29.45#onoff#VAL	cygnusa	161.7	72.8	3u	1	l	4943.00	0.9938	57.61	729.9	193.649	1.04
2011.067.07:43:29.45#onoff#VAL	cygnusa	161.7	72.8	4u	2	r	4943.00	0.9845	167.7	840.6	79.017	0.41
2011.067.07:43:29.45#onoff#VAL	cygnusa	161.7	72.8	5u	1	l	4945.00	0.9851	57.66	729.9	193.592	1.04
2011.067.07:43:29.45#onoff#VAL	cygnusa	161.7	72.8	6u	2	r	4945.00	0.9877	168.0	837.7	79.321	0.41
2011.067.07:43:29.45#onoff#VAL	cygnusa	161.7	72.8	7u	1	l	4947.00	0.9833	57.81	727.6	190.954	1.03
2011.067.07:43:29.45#onoff#VAL	cygnusa	161.7	72.8	8u	2	r	4947.00	0.9865	171.5	837.2	79.032	0.40
2011.067.07:43:29.45#onoff#VAL	cygnusa	161.7	72.8	9u	1	l	4949.00	0.9959	58.03	718.5	187.139	1.02
2011.067.07:43:29.45#onoff#VAL	cygnusa	161.7	72.8	au	2	r	4949.00	0.9907	172.8	839.8	78.740	0.40
2011.067.07:43:29.45#onoff#VAL	cygnusa	161.7	72.8	bu	1	l	4953.00	0.9867	58.17	712.0	179.502	1.00
2011.067.07:43:29.45#onoff#VAL	cygnusa	161.7	72.8	cu	2	r	4953.09	0.9939	171.5	834.4	77.979	0.40
2011.067.07:43:29.45#onoff#VAL	cygnusa	161.7	72.8	du	1	l	4955.00	0.9900	58.04	713.0	175.949	1.01
2011.067.07:43:29.45#onoff#VAL	cygnusa	161.7	72.8	eu	2	r	4955.00	0.9920	173.7	837.8	76.844	0.40
2011.067.07:43:29.45#onoff#	source	Az	El	De	I	P	Center	Comp	Tsys	SEFD	Tcal(j)	Tcal(r)

SEFD is the "system equivalent flux density" (Jy), defined as the flux density of a radio source that doubles the system temperature. $SEFD = T_{sys}/G$

$$\text{Comp} = \frac{\text{ONSC} - \text{ONSO}}{\text{OFFC} - \text{OFFS}}$$

$$\text{SEFD} = S \times \frac{\text{OFFS} - \text{ZERO}}{\text{ONSO} - \text{OFFS}}$$

$$T_{\text{sys}} = T_{\text{cal}} \times \frac{\text{OFFS} - \text{ZERO}}{\text{OFFC} - \text{OFFS}}$$

$$T_{\text{cal}}(\text{Jy}) = S \times \frac{\text{OFFC} - \text{OFFS}}{\text{ONSO} - \text{OFFS}}$$

$$T_{\text{cal}}(\text{K}) = \text{DPFU} \times \text{gain}(\text{el}) \times T_{\text{cal}}(\text{Jy})$$

$$T_{\text{cal}}(\text{r}) = T_{\text{cal}}(\text{K}) / T_{\text{cal,rxg}}(\text{K})$$

Feedback from JIVE



Ampcal station log check: VGOS V01105

Station	#fivept#xoffset in log?	Pointing error [deg]	#onoff#VAL in log?	Tcal(r) should be 0.9-1.1
Gs	Yes	0.01	Only per IF (not BBC)	1.5
Is	No	N/A	No	N/A
K2	Yes	0.02	Only per IF (not BBC)	0.9-1.1
Mg	Yes	<0.01	Only per IF (not BBC)	1.5
Oe	Yes	<0.01	Yes	0.9-1.1
Ow	Yes	<0.01	Yes	0.9-1.1
Wf	Yes	0.03	No	N/A
Yj	No	N/A	Yes	3

Disclaimer: This is **only ONE experiment** - there may be good reasons for the red marks. Please check!

Ampcal station log check: S/X r1995

Station	#fivept#xoffset in log?	Pointing error [deg]	#onoff#VAL in log?	Tcal(r) should be 0.9-1.1
Ht	No	N/A	No	N/A
Kk	Yes	<0.01	Yes	0.03
Kv	No	N/A	No	N/A
Ma	No	N/A	No	N/A
Ns	No	N/A	No	N/A
Nt	No	N/A	No	N/A
Ny	Yes	<0.01	Yes	0.5-2.0
On	Yes	<0.01	Yes	0.8-1.2
Wn	No	N/A	No	N/A
Wz	No	N/A	No	N/A
Yg	Yes	0.04	No	N/A

Disclaimer: This is **only ONE experiment** - there may be good reasons for the red marks. Please check!