





PEPSI User's manual

Issue

Date

1.0

March 6, 2020





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1 Revision History

Issue	Date	Changes	Responsible
1.0	13.01.2020	First version	S. Järvinen

Table 1: Revision history





2 About this document

This document describes the design details of the PEPSI spectrograph that are relevant for planning the observations. It also describes in detail how the observations are performed.





3 General information

PEPSI has PI instrument status at the LBT until 2020A. If you wish to observe with PEPSI and have questions beyond the usual, please contact either the PI Prof. Dr. Klaus G. Strassmeier at AIP or Mark Wagner at LBTO. PEPSI is foreseen to operate as a facility instrument by Feb. 1, 2020.

The basic description of PEPSI is given by Strassmeier et al. (2015, AN, 336, 324) and (2018, SPIE, 10702, 12).





4 Planning the observations



Figure 1: PEPSI observation modes.

4.1 Spectral ranges

The entire spectral range of the PEPSI is from 383 to 912 nm but it **can not** be covered by a single exposure (see, Fig.1 for more details). PEPSI has two arms, blue and red, that cover spectral ranges 383-544 nm and 544-912 nm, respectively. Each arm has three cross-dispersers:

- CD1 383-426 nm in blue arm
- $\bullet~{\rm CD2}$ 426-480 nm in blue arm
- $\bullet~$ CD3 480-544 nm in blue arm
- CD4 544-627 nm in red arm
- CD5 627-741 nm in red arm
- CD6 741-912 nm in red arm

Simultaneously, one can observe one wavelength region in blue and one in red, however, CDs 3 and 4 can not be used at the same time.





4.2 Resolution modes

Observations can be done using three different fibers, that is with three different resolutions:

- 100 μ m gives R=250,000
- 200 μ m gives R=130,000
- 300 μ m gives R=50,000

4.3 Exposure times

Exposure time depends on the target, the wanted resolution, and used cross-disperser. Exposure times can be estimated using the exposure time calculator that is available on PEPSI web page.

One can have different exposure times and numbers of exposures for cross-dispersers in blue and in red arm (examples below):

- 30 min in blue, 20 min in red \Leftarrow red is idle for 10 minutes
- 30 min in blue, 2×15 min in red \Leftarrow both are ready around the same time
- 3×10 min in blue, 6×5 min in red ⇐ both are ready around the same time, blue likely idle for some minutes due to read-out times (80 sec / read-out)





5 Executing the observations

5.1 Accessing PEPSI Graphical User Interface (GUI)

Observations can be executed either using the PEPSI 4K monitors in the LBT control room or one can observe remotely.



Figure 2: PEPSI computer screens at LBT control room.

In case of remote observing from Linux machine

- take VNC connection by typing in terminal vncviewer -via ajarvinen@ssh.lbto.org -shared 192.168.164.14:
- environment (telemetry, see Sect. 7) status can be seen at 192.168.164.14:2
- passwd is given on need to know basis
- in the end, close the connection from the upper corner 'x'

from Mac

- \bullet one has to first make a \mathbf{VPN} connection vpn.lbto.org
- username and passwd are given on need to know basis
- and then take a VNC (with TigerVNCViewer) connection to server alpha.pepsi.lbto.org:1 (or :2)
- in the end, close the connection with Fn+F8, exit viewer and disconnect VPN







Figure 3: *Top*: VNC view of the user interface (:1). *Bottom*: VNC view of the telemetry (:2).

The PEPSI user interface program should be kept running all the time.

If it is not running, click Activities in the left upper corner. You should get a menu having PEPSI logo. Click on that logo to open the program. Alternatively one can use a terminal to open it (if no terminals open, open a new one). On **pepsi@alpha** type 'pepsi'.

5.2 Connecting with PFU

- 1. Now you should have 'PEPSI Spectrograph Control Interface' open.
 - In case PEPSI has been used for solar observations (SDI selected) and you have text 'Waiting for Sun' in the 'PEPSI Spectrograph Control Interface', click 'Abort' to be able to start night observations.





						PEP	SI Spec	trogra	aph	Contro	ol Interf	ace						×
		Exposure		Nu	m	Cross	Dispe	rser			E	xposure		Nui	m	Cros	ss Dispers	er
	00:	26:00.000	*	1	*	3: 48	00 - 54	41	\$	M	00:2	5:00.00	0	1	*	5:6	278 - 7419	\$
	00:	26:00.000	*	3	*	2: 42	65 - 480	00	\$		00:2	5:00.00	0	3	*	4: 5	441 - 6278	\$
	00:	26:00.000	* *	2	* *	1: 38	37 - 420	65	\$		00:2	5:00.00	0	2	* >	6: 7	419 - 9067	\$
	зт	O 100	0	200P	۲	PFU	0	VATT			PEP	SI /	TELESCOPE	PE	PSI	Spec	trograp terface	h
		200	100L	0	POL	0	SDI		AIP									
🗆 st	ы	O 300	0	130L	0	ThAr	0	FPE		Tim	e lag:	00:00:	00			V5558	¥ Sgr	
Mir	ror	I	FPE		0	Traces	0	Flat			Note:							
🖲 ВІ	lue	Off			0	Master	0	Dark		Obse	vers:	CW MW	II					_
O R	O Red O On O Manual									St	art	Stop		Abort		Calibs	Progr	am
	SXS: LBT SXT: LBT										D	CT: LBT				DXS	: LBT	
exp	exp 1/3 subexp 1/1 cycle 1/1 total 2/										exp 1/3 subexp 1/1 cycle 1/1 tota							2/4
	00:18:04 - 00:28:31 - 00:44:04 00:10:26.4 (40%) - 00:15:33.6 (60%)										00:18:04 - 00:28:31 - 00:44:04 00:10:26.4 (40%) - 00:15:33.6 (60%)							

• Click on LBT check button to connect and open '**PEPSI@LBT**':



• Check that PFU radio button is selected:

			PEPSI S	Spectrog	raph	Contro	linterfa	ice					×
	Exposure	Num	Cross Di	sperser			Ex	posure		Num	Cros	s Disperse	r
Ø0:	26:00.000	1	3: 4800 -	5441	\$		00:26	:00.000	* *	1	5: 63	278 - 7419	\$
Ø0:	26:00.000	3	2: 4265 -	4800	\$		00:26	:00.000	< >	3	4: 54	441 - 6278	٥
00:	26:00.000	2	1: 3837 -	4265	٢		00:26	:00.000	< >	2	6: 74	419 - 9067	٥
VATT VATT POL SDI Mirror Blue O Red	100 0 2 200 0 1 300 0 1 FPE Off On	1000P 000L 00L 00L 00 00 00 00	PFU (POL (ThAr (Traces (Master (Manual	O VATT O SDI O FPE O Flat O Dark		AIP First of Time Obser	vers:	0 00:00:0 CW MW 1 Stop	90 \$	PEP Co Last c	SI Spec ntrol In ycle: 1 V5558	trograpi terface	, m
5	SXS: LBT		SXT: LB1				DX	T: LBT			DXS	LBT	
exp 1/3	subexp 1/1	cycle	1/1	total 2/4	1	exp	1/3	sube	xp 1/1	(c	ycle 1/1	total 2/	4
	00:18:04 - 00 00:10:26.4 (40%	: 28:31 - 00: 4	44:04 .6 (60%)		00:18:04 - 00:28:31 - 00:44:04 00:10:26.4 (40%) - 00:15:33.6 (60%)						56)		

2. A 'PEPSI@LBT' window should appear:







5.3 Selecting and sending targets to LBT

1. Click 'Program' button on '**PEPSI Spectrograph Control Interface**':

		PE	PSI Spectrograp	h Contr	ol Interfac	e					×
	Exposure	Num Cros	s Disperser		Exp	osure		Num	Cros	s Disperse	r
00:	26:00.000	3:4	800 - 5441 😫]	00:26:	00.000	*	1	5: 62	78 - 7419	\$
00:	26:00.000 🖨 3	2:4	265 - 4800]	00:26:	00.000	*	3	4: 54	41 - 6278	٥
00:	26:00.000 🖉 2	1:3	837 - 4265 😫		00:26:	00.000	* *	2	6: 74	19 - 9067	\$
LBT	O 100 O 20	OP O PFU	O VATT	AIP	PEPSI	/	Lang	PEPSI Cont	Spect	crograph cerface	,
D POL	200 O 10 300 O 13	OL O ThAT	O FPE	First	cycle: (0:00:0	0	Last cyc	le: 1 V5558	€ Sgr	_
Mirror Blue	FPE Off	O Traces	O Flat		Note:						
O Red	O On	O Manua	1	Obse	art	W MW I Stop	I	Abort	Calibs	Progra	m
5	XS: LBT	SXT	LBT		DXT	LBT			DXS:	LBT	
exp 1/3	subexp 1/1 00:18:04 - 00:2	cycle 1/1	total 2/4	ex	0 1/3	suber 00:18:	(p 1/1 04 - 00	cyci :28:31 - 0	ie 1/1 0:44:04	total 2/	4
	00.20.20.4 (40.6)		<i>•</i> 7		01		- 1.70 %	, - 50.15.	55.5 (00)	~,	

- 2. When you
 - a) **already have an observing program**, a 'Observing Programmes' window and a 'Target Visibility Plot' window opens. If not, go to 'Table' menu, choose 'Open or Close Table' and select the correct one.

			Observing	programm	ies 201906	23.obs		×					Target Visibi	lity Plot			×
[r]	Altitude	Parallactic	Azimuth	Airmass	DiumalVel	MoonDist	Phases		
Select Ta	ble													al Cide and The			
S & 7		-	¢>					\$	130				00 20:00 21:00	22:00 23:00		Date: 23	/06/2019
Marre	V	Eiber	Telescope	Start	End	Duration							a and a state of the		1.00	Last: 23	/06/2019
10,101001		200	DE	20.55.00	22.20.00	00.24.00			08 gt						1.02	Altitude: 25	4
un 131321	5.89	200	Pru	20:55:00	21:19:00	00:24:00			¥ 70						3.06	UT offerty	
ТСтв	10.00	200	PFU	21:19:00	22:43:00	01:24:00										or onset.	¥
V5558 Sgr	12.25	200	PFU	22:43:00	01:32:00	02:49:00		_	60						1.15	Sunset:	19:39:12
KS Upn	11.30	200	PFU	01:32:00	02:19:40	00:47:40		_	50						1 30	Suprise:	85-84-41
V407 Cyg	14.68	200	PFU	02:19:40	03:43:40	01:24:00										MightTime	0010111
JPA OC	5.03	200	PFU	03:43:40	04:20:40	00:37:00		_	40					•	1.55	ingiterinie.	09.23.50
vooos upn	17.00	200	PFU	04:20:40	00:23:00	02:02:20			30		100		and the second		1.99	GrayTime:	08:21:07
								_								DarkTime:	07:09:25
									20						2.90	BlackTime:	05:50:29
Record:	2	Marke	d: 1 /	ncluded:	0 E	rased: 0	Total: 7		10						5.60	MoonPhase:	0.661
			22/06/202	0			FF . 00 (*)		, L.	£.1/						80 111911	1.04
	current	date:	23/06/201	9 🗑	starting	ume: 20:	55:00		19:00					04:00 05:00 Local Tim	06:00	Si Aql	RS Oph
F	Readout	time:	80 🗳						2	2:42 01:32 (0	2:50)	1	0 90 (90)	ľ			





- If GUI had to be restarted, check that the correct program is open (YYYYMMDD.obs)!
- select the target (highlighted with teal color) you want to observe and send it to LBT. This does not yet move the telescope! Note that target can be sent already during CCD readout!



• check that 'PEPSI@LBT' has the same target as you chose, or resend, and check that 'PEPSI Spectrograph Control Interface' changed (target name, selected cross-dispersers, exposure time, etc.) according to selected target. Note that the changes happen only after CCD readout has finished.



• if you need to change pre-defined exposure times, click 'Edit fields' and a new window pops up and you can make the changes. Note that values in 'PEPSI Spectrograph Control Interface' do not change unless you send the target information again (see A.) You can also change values in 'PEPSI Spectrograph Control Interface' directly, but then the visibility





plot does not change and block will not remember the changes made in future.

Observing programmes 20190623.obs X									
Select Table									
Vmme V Fiber Telescope Start End Duration H 131951 5.89 200 PFU 20:55:00 21:19:00 00:24:00				Edit Obser	ving Blo	ock			×
T rb 10.00 200 PFU 21:19:00 22:43:00 01:24:00	Exposure	Num	Cro	oss Disperser		Exposi	ıre	Num	Cross Disperser
RS ph 11.30 200 PFU 01:32:00 02:19:40 00:47:40	00:26:00.000	3	2:	4265 - 4800 🗘	M	00:26:00	000 🚔	3	4: 5441 - 6278
58 A1 5.63 200 PFU 03:43:40 04:20:40 00:37:00	00:26:00.000	▲ 3	▲ 3: 4	4800 - 5441 🖨		00:26:00	000	3	5: 6278 - 7419 🖨
	00:26:00.000	▲ 2	1:	3837 - 4265 🗘		00:26:00	000	2	6: 7419 - 9067 🗘
	Slicer	Mirror	FPE	Tele	scope	POL SX	POL DX		V5558 Sgr
Record: 2 Marked: 1 Included: 0 Erased: 0 Total: 7 Current date: 23/06/2019 Starting time: 20:55:00 Image: 20:55:00	 ○ 100 ○ 200P ● 200 ○ 100L 	Blue	Off	PFU O	VATT			Num of c	ycles: 1
Readout time: 80	O 300 O 130L	O Red	O On	O POL O	SDI	QUV	QUV	Overhead	i time: 00:05:00 🗳

b) don't have any targets or you want to change targets

- See Section 4 for additional information!
- click 'add another object' in 'Observing programmes' window and a new window having targets pops up

			Observing	j programm	ies 201906	23.obs	×		Observing target	s in /h	nome/pepsi/ses/pe	psi/PEPSI/objec	cts.tab	×
Ir							1	File Table S	elect View					
Select Ta	ble									-				
		5	2				<u>^7</u> ,		<u>i e la Nici</u> e	1				
			47				স্ফ	Name	e V		Spectrum	Туре	RA	De
Name	V	Fi	Telescope	Start	End	Duration		Alpha Aur	8	. 88	G1III+K0III		05:16:41.36	+45:
HD 121051	E 90	200	DELL	20.55.00	21.10.00	00.24.00		Alpha Cyg	1	. 25	A2Iae		20:41:25.92	+45:
10 151551	5.05	200	FIU	20.35.00	21.15.00	00.24.00		TZ Tri	4	.95	G0III+G5III		02:12:22.28	+30:
I Crb	10.00	200	PFU	21:19:00	22:43:00	01:24:00		UX Ari	6	.37	KOIV	RSCVn	03:26:35.39	+28:
V5558 Sgr	12.25	200	PFU	22:43:00	01:32:00	02:49:00		51 Peg	.5	.46	G2.5IVa	planet	22:57:27.98	+20:
RS Oph	11.30	200	PFU	01:32:00	02:19:40	00:47:40		HR 718	4	.30	B9III	Solar	02:28:09.54	+08:
V407 Cvg	14.68	200	PEU	02:19:48	03:43:40	01:24:00		HR 153	3	. 66	B2IV	Solar	00:36:58.28	+53:
59 Ac1	5 62	200	DEU	02:42:40	04.20.40	00.27.00		HR 3454	4	.30	B3V	Solar	08:43:13.47	+03:
JO AQU	5.05	200	FIU	05.45.40	04.20.40	00.37.00		EK Dra	7	.61	G1.5V	BYDra	14:39:00.22	+64:
V3665 Oph	17.00	200	PFU	04:20:40	06:23:00	02:02:20		II Peg	7	.20	KOV	RSCVn	23:55:04.05	+28:
								HD 194937	6	.23	G9III		20:28:07.54	+08:
								Theta01 Ori	C 5	.13	07V		05:35:16.46	-05:
								Beta Tau	1	.65	B7III		05:26:17.51	+28:
Record:	2	Mark	ed: 1	included:	0 E	rased: 0	Total: 7	HR 1544	4	. 35	A1Vn	Solar	04:50:36.72	+08:
								24 Tau	6	.28	AOV	Pleiades	03:47:21.04	+24:
	Current	date	23/06/201	10	Starting	time: 20	55.00	WASP 8	9	. 87	G6	TEP	23:59:36.07	-35:
	current	uute	25/00/20.	- J - J - J - J - J - J - J - J - J - J	starting	20.	.55.00							
F	eadout	time	80					4	111					>
								Record: 0	Marked: 14	Inc	luded: 0	Erased: 0	Total: 1635	

• choose the target and send it to the observing block

	Observing target	s in /I	home/pepsi/ses/p	epsi/PEPSI/objec	ts.tab	×
File Table Sel	ect View					
X B B W	Σ 🔊 🔇 🤉	¢	-	_		
Name	V	1	Spectrum	Туре	RA	De
Alpha Aur	θ.	80	G1III+K0III		05:16:41.36	+45:
Alpha Cyg	1.	25	A2Iae		20:41:25.92	+45:
TZ Tri	4.	95	G0III+G5III		02:12:22.28	+30:
UX Ari	6.	37	KOIV	RSCVn	03:26:35.39	+28:
51 Peg	5.	46	G2.5IVa	planet	22:57:27.98	+20:
HR 718	4.	30	B9III	Solar	02:28:09.54	+08:
HR 153	3.	66	B2IV	Solar	00:36:58.28	+53:
HR 3454	4.	30	B3V	Solar	08:43:13.47	+03:
EK Dra	7.	61	G1.5V	BYDra	14:39:00.22	+64:
II Peg	7.	20	KOV	RSCVn	23:55:04.05	+28:
HD 194937	6.	23	G9III		20:28:07.54	+08:
Theta01 Ori C	5.	13	07V		05:35:16.46	-05:
Beta Tau	1.	65	B7III		05:26:17.51	+28:
HR 1544	4.	35	A1Vn	Solar	04:50:36.72	+08:
24 Tau	6.	28	AOV	Pleiades	03:47:21.04	+24:
WASP 8	9.	87	G6	TEP	23:59:36.07	-35:
3	11					>
Record: 0	Marked: 14	Inc	luded: 0	Erased: 0	Total: 1635	

• continue as in 2-a.

3. after the telescope operator gives the permission, click 'PRESET'





- 'PRESET' to next target can be done already during CCD readout.
- Note that 'Preset' can be done in four different modes, but only the first one should be used unless requested otherwise by the telescope operator:
 - Active the normal mode, uses wavefront sensor and guiding
 - Guide no wavefront sensor is used, guiding yes
 - Acquire only points and centres on hot spot
 - Track only points

5.4 Guiding

Guiding (and also focusing) is done by the telescope operator. Do not do anything unless asked.

• 'Engage' opens the hatches so that the telescope operator can put the star in the position.







5.5 Observing

Start observations by clicking 'Start' in 'PEPSI Spectrograph Control Interface':

			PEF	SI Spectrograp	Control Inte	rface				×
	Exposure	Num	Cross	Disperser		Exposure	Num	Cross	Disperser	r
✓ 00	:26:00.000	1	3: 48	00 - 5441 🗘	№ 00::	26:00.000	1	5: 62	78 - 7419	\$
☑ 00	:26:00.000	3	2:42	65 - 4800 🗘	⊠ 00::	26:00.000 🚔	3	4: 54	41-6278	\$
00	:26:00.000	2	1:38	37 - 4265 😫	00::	26:00.000 🚔	2	6: 74	19 - 9067	\$
LBT	0 100 O	200P	PFU	O VATT			PEPS	Spect	rograph erface	,
	● 200 O	100L	O POL	O SDI	AIP		Last or	le: 1	A	
🗆 SDI	O 300 O	130L	O ThAr	O FPE	Time lag:	00:00:00		V5558 :	Sgr	
Mirror	FPE		O Traces	O Flat	Note:					-
Blue	Off		O Master	O Dark	Observers:	CW MW II				
O Red	O On		O Manual		Start Stop Abort Calibs Pro					
	SXS: LBT		SXT:	LBT	D	XT: LBT		DXS:	LBT	
exp 1/3	subexp 1/1	c	ycle 1/1	total 2/4	exp 1/3	subexp 1/	1 сус	le 1/1	total 2/4	4
	00:18:04 - 0 00:10:26.4 (40%	D:28:31 6) - 00:1	- 00:44:04 15:33.6 (60%)	00:18:04 - 00:28:31 - 00:44:04 00:10:26.4 (40%) - 00:15:33.6 (60%)					

If the exposure needs to be interrupted for any reason, use

- 'Stop' in case you want to save the data obtained so far
- 'Abort' in case the exposure time was not long enough for useful data

5.6 Calibration frames

After the observing night is over, it is time to take the calibration frames. Check that you have stopped guiding and guider camera is on pause.

In the 'PEPSI Spectrograph Control Interface' window:

1. Click 'Calibs' button to get a pop-up window:







		Ca	libration Seque	ncer		×
ThAr	100	200	300	🗖 200P	☑ 100L	☑ 130L
FPE	100	200	300	🗖 200P	☑ 100L	☑ 130L
Traces	100	200	300	🗖 200P	☑ 100L	☑ 130L
Flat	100	200	300	🗖 200P	🗌 100L	🗆 130L
Master	100	200	300	🗖 200P	🗌 100L	🗖 130L
Dark	🗌 any					

- 2. Check that for wanted fiber(s) ThAr, FPE, and Traces are chosen
- 3. Click 'START' button on Control Interface window:



4. When calibration frames are ready, click 'Calibs' again to close the calibration sequencer window and to be able to do anything else.







6 Raw data

6.1 Viewing obtained spectra

It is good to take a look at the spectra in order to see if you should change exposure times etc.

1. Select the spectrum (highlighted with teal colour) you want to look at from 'FITS Image Browser' with Enter or click the arrow icon to send it to 'Spectrum viewer'. One can also look at multiple spectra by selecting them and clicking double arrow icon.

						FITS	mage Bro	wser or	n pepsi@i	alpha:/hom	e/pepsi	/data/pepsi/						×
File Select Table	Tools																	
	26																	劵
Eile	Ext	Date obs	UT-obs	Exptine	Inspetyp	Object	Crose	is [Eiber 3	SXS I SXT I	DXT	DXS SUBET DXBET	SXEOS DXEOS	SNR Phase	PID	Note Char	ave	Fielens Nirror Ale
peor (b. 20100525, 017	6194	25/05/2019	23-43-08-5	00.00.10.000	0000	,	1. 3837	4265	130	Thác	Thôn					210	1 5 2 7	81.00
pepsib.20190525.018	fits	25/05/2019	23:44:58.6	00:00:20.000	etalon		3: 4800	- 5441	130L	FPE	FPE					207	.118	Red
pepsir.20190525.020	fits	25/05/2019	23:44:58.6	00:00:07.000	etalon		5: 6278	- 7419	130L	FPE	FPE					205	5.110	Red
pepsir.20190525.021	fits	25/05/2019	23:46:58.7	00:00:07.000	etalon		6: 7419	- 9067	130L	FPE	FPE					204	.214	Red
pepsib.20190525.019	fits	25/05/2019	23:48:45.9	00:00:00.120	traces		3: 4800	- 5441	130L	Flat						207-	.994	Red
pepsir.20190525.022	fits	25/05/2019	23:48:45.9	00:00:00.035	traces		5: 6278	- 7419	130L	Flat						205	.987	Red
pepsib.20190525.020	fits	25/05/2019	23:50:28.5	00:00:00.120	traces		3: 4800	- 5441	130L		Flat					207	5.216	Red
pepsir.20190525.023	fits	25/05/2019	23:50:28.6	00:00:00.035	traces		5: 6278	- 7419	130L		Flat					205	5.206	Red
pepsir.20190525.024	fits	25/05/2019	23:52:11.1	00:00:00.020	traces		4: 5441	- 6278	130L	Flat						206	8.911	Blue
pepsib.20190525.021	fits	25/05/2019	23:52:11.2	00:00:00.300	traces		2: 4265	- 4800	130L	Flat						268	7.591	Blue
pepsib.20190525.022	fits	25/05/2019	23:53:54.0	00:00:00.300	traces		2: 4265	- 4800	130L		Flat					208	8.017	Blue
pepsir.20190525.025	fits	25/05/2019	23:53:54.0	00:00:00.020	traces		4: 5441	- 6278	130L		Flat					206	.332	Blue
pepsib.20190525.023	fits	25/05/2019	23:55:37.1	00:00:00.300	traces		2: 4265	- 4800	130L	Flat						208	.725	Red
pepsib.20190525.024	fits	25/05/2019	23:57:17.8	00:00:00.300	traces		2: 4265	- 4800	130L		Flat					208	.966	Red
pepsib.20190525.025	fits	25/05/2019	23:58:58.4	00:00:01.000	traces		1: 3837	- 4265	130L	Flat						210	8.169	Red
pepsir.20190525.026	fits	25/05/2019	23:58:58.4	00:00:00.055	traces		6: 7419	- 9067	130L	Flat						204	1.274	Red
pepsib.20190526.000	fits	26/05/2019	60:00:40.9	00:00:01.000	traces		1: 3837	- 4265	130L		Flat					216	2.938	Red
pepsir.20190526.000	Tits	26/05/2019	00:00:40.9	00:00:00.055	traces		6: 7419	- 9067	130L		Flat					204	.052	Red
pepsib.20190526.001	fits	26/05/2019	00:02:23.7	00:00:01.000	traces		1: 3837	- 4265	130L	Flat						210	8.198	Blue
pepsib.20190526.002	Tits	26/05/2019	00:04:04.7	00:00:01.000	traces		1: 3837	- 4265	130L		Flat					210	5.4//	BLUE
pepsib.20190526.003	fits	26/05/2019	03:07:06.7	01:25:00.000	object	HD 142124	3: 4800	- 5441	130L	VATT	FPE			86	tess	207	5.304	Red
peps1r.20190526.001	TITS	26/05/2019	03:07:06.7	01:25:00.000	object	HD 142124	5: 62/8	- 7419	138L	VALL	FPE			162	tess	205	. 294	Red
peps10.20190526.004	1115	26/05/2019	04:34:54.8	01:25:00.000	object	ND 143252	5: 4000	- 5991	130L	VALL	TPC .			37	tess	207	0.094	Red
peps11.20190526.002	1115	26/05/2019	04:34:54.0	01:25:00.000	object	HD 143232	5: 0270	- 7419	130L	TALL	FPE			142	tess	205		Neu
peps10.20190526.005	fits	26/05/2019	06:02:16.4	01:10:00.000	object	HD 107740	5: 4000	- 5441	130L	VALL	EDE			100	tessi	207	0.323	Red
peps11.20190526.005	1115	26/05/2019	07:15:20 7	01:10:00.000	object	HD 107740	2: 4900	- 5007 E441	1201	MATT	COC			92	terri	204	.025	Red
pepsie 20100520.000	file	20/05/2019	07.15.30.7	01.25.00.000	object	HD 199207	6. 7410	0067	1204	MATT	505			149	tessi	207	2 200	Ded
pepril 20190526.007	****	26/05/2019	09:47:59 9	01:15:00.000	object	ND 195497	2: 4900	5441	1204	MATT	EDE			115	terrl	207	277	Ped
pepsir 28198526 885	fite	26/05/2019	68-42-58 8	81-15-88 888	object	HD 185497	6. 7419	. 9867	1384	VATT	FDF			171	tessi	204	569	Part
pepsib.20190526.008	fits	26/05/2019	10:00:29.7	01:34:59.223	object	HD 199695	3: 4800	- 5441	1301	VATT	FPF			79	tessl	207	163	Red
pepsir 28198526 886	fite	26/05/2019	18:88:29.7	81-34-59 237	object	HD 199695	6. 7419	. 9867	138	VATT	FDF			142	tessi	204	454	Red
pepsib.20190527.000	fits	27/05/2019	03:06:36.8	01:25:00.000	object	HD 143077	3: 4800	. 5441	130	VATT	EPE			77	tess	207	. 593	Red
pepsir.20190527.000	fits	27/05/2019	03:06:36.8	01:25:00.000	object	HD 143977	5: 6278	- 7419	130L	VATT	FPE			154	tess	205	.587	Red
pepsir.20190527.001	fits	27/05/2019	04:33:57.1	01:10:00.000	object	HR 7247	6: 7419	- 9867	130L	VATT	FPE			274	tessl	204	.454	Red
pepsib.20190527.001	fits	27/05/2019	04:33:57.2	01:10:00.000	object	HR 7247	3: 4800	- 5441	130L	VATT	FPE			166	tessl	207	5.140	Red
																		V
٤																		
Record	65			Marked: 0			Inclu	ied: 0				Erased: 0		Total:	101			
4																		

2. The active window in 'Spectrum viewer' has a cyan frame. Select the area you want to look at closer by drawing a red box with, for example, a mouse. To see a summed spectrum from selected area Press 'Enter', or Click the normal 'Sigma' icon (one dimensional cross-cut in horizontal direction) on top of the viewer (the other sigma makes it in vertical direction)



3. Now you have a spectrum plot where you can see the ADUs:







6.2 Estimating signal-to-noise ratio

1. Select an area with mouse from highest continuum values to lowest (don't be distracted by high fabry-perot peaks) and click 'Sun' icon on top of the spectrum viewer:



2. You get a pop-up window there the S/N estimate is given, save that information into fits list by clicking 'Save':

Signal/Noise					
	FITS keyword	CCD gain 🛨			
	GAIN	0.5			
5.3	1.				
	Estimated	signal/noise ratio 559			





7 Telemetry

It is essential to **check the telemetry** from time to time:



If something is wrong and you are not trained to fix the problem, contact a person who is!

The most important is the 'Pressure' in **PEPSI Chamber** window. If 'In' value has red background, and one sees that pressure curves follow each others, everything is not fine.







Other important measure is 'Dewar heater' in PEPSI CCD window. If it approaches 0, the dewar pressure rises and pumping is needed.







8 Troubleshooting

Sometimes the software program freezes or even crashes (STA Archon time out). If that happens, find the following terminal

		Terminal					×
File Edit View Search Terminal Tabs Help							
Terminal						Æ	
Compress pepsib.20190629.088.fits 00.00:26 Compress pepsib.20190629.088.fits 00:00:28 Compress pepsir.20190629.089.fits 00:00:28 Compress pepsir.20190629.084.fits 00:00:24 Compress pepsib.20190629.090.fits 00:00:29 29/06/2019 15:37:47 Blue Archon 29/06/2 29/06/2019 15:37:55 Connection refused in ^CCought signal 2: Interrupt Cought signal 2: Interrupt	.771 .799 .329 .828 .887 019 15 019 15 connec	:37:47 Blue Ar :37:49 Red Ar t to chatem.pe	chon Timeo chon Timeo psi.lbto.org∶	ut in starting of ut in starting of 12346	image image	readout readout	t t
<pre>[pepsi@alpha ~]# pepsi Read FITS Headers time 00:00:03.268 in 8 Read FITS Headers time 00:00:04.050 in 8 blu 192.168.164.31:5000 Cryocon,Model 24C red 192.168.164.30:5002 Cryo-con,24C,2034 10.0.2.2:243336 -> 10.0.2.2:2424 STA Arch 10.0.1.11:56180 -> 10.0.1.1:4242 STA Arch ^CCought signal 2: Interrupt Cought signal 2: Interrupt Cought signal 2: Interrupt Cought signal 2: Interrupt Cought signal 2: Interrupt</pre>	thread thread ,20443 30,3.2 on (X1 on (X1	s 7,2.23B 2B 2-F 1.0.1028) 2-F 1.0.1028)	Blue uploaded Red uploaded	pepsiblue 100KHz pepsired_100KHz.a	.acf acf		
[pepsi@alpha ~]# pepsi Read FITS Headers time 00:00:02.195 in 8 Read FITS Headers time 00:00:03.949 in 8 blu 192.168.164.31:5000 Cryocon,Model 24C red 192.168.164.30:5002 Cryo-con,24C,2034 10.0.2.22:59118 -> 10.0.2.2:4242 STA Arch 10.0.1.11:41772 -> 10.0.1.1:4242 STA Arch	thread thread ,20443 30,3.2 on (X1 on (X1	s s 7,2.23B 2B 2-F 1.0.1028) 2-F 1.0.1028)	Blue uploaded Red uploaded	pepsiblue_100KHz pepsired_100KHz.a	.acf		

and type Ctrl+c and start all over again.

If terminal gives 'Lost connection with Camera', one can go to 'PEPSI Control Unit' Maintenance, but in order to do that, **you should know what you are doing**.