SPICE

SPICE is a spectrometer that will measure plasma density and temperature, flow velocities, presence of plasma turbulence and composition of source region plasma on the solar disk.

TM figures

Allocated TM	17.5 kbits/s	
Download capacity per orbit	5.670 GB	= 45.36Gbits (over 30 days)

Subtelescopes/detectors

Source: SPICE User Manual Iss 5.0 (Nov 2014)

SPICE consists of only **1 spectral telescope** with slit and scanning mirror. The 2D image (1 wavelength dimension, 1 spatial dimension along the slit) is projected on **2 detectors**, 1 covering the long wavelengths, the other covering the short wavelengths.

	wavelength range	detector (readout) size	FOV	Volume/Detector readout
SW array	(approx.) 70.1nm - 79.3nm	968px @0.0095nm/pix x 800 px (along slit)	11' (14' for 30" slit) x 16'	1.55MB
LW array	(approx.) 97.1nm - 105.1nm	968px @0.0083nm/pix x 800 px (along slit)	11' (14' for 30" slit) x 16'	1.55MB

Observational modes

Source: SPICE User Manual Iss 5.0 (Nov 2014)

SPICE's primary mode of observations consist of rapid on-disk scans that characterise plasma dynamics (SPICE Dynamics mode), alternated with slower composition scans that map the source regions of solar wind streams (SPICE Composition Mapping). However SPICE also has alternative modes or 'studies' listed below. These studies will be preset on board and can be called via TC, providing some of the study parameters (see mode pages).

Observing mode	Use Case/Target	Line List	# repeats	Total Duration	Data Rate	Max time / orbit
				(min)	(kbits/s)	
SPICE Composition Mapping **= NOMINAL MODE 1**	Centre, Poles, limb, AR	15 lines (2 profiles, 13 intensities)	1	180	**0.45**	
SPICE Dynamics mode **=NOMINAL MODE 2**	Centre, AR, CH	H I, C III, O VI, NeVIII profiles + 6 intensities	10	110	**20.46**	
SPICE Spectral Atlas	Sun centre, limb, AR, CH	Full spectrum	2	22	**40.34**	
SPICE Limb mode	Low corona above limb	C III, O VI, Ne VIII profiles + 3 intensities	1	240	**2.5**	
SPICE CME Watch	AR, prominence, limb	5 spectral profiles, 10 intensities	30	22.66 hr	**4.46**	

SPICE 30"-wide Movie (sit&stare)	centre, AR	1-2 line profiles	1	10	**34.44**	
SPICE 90"-wide Movie	centre, AR	1-2 line profiles	40	16	**20.28**	
SPICE Waves mode (sit&stare)	QS, CH, AR	C III, O VI, NeVIII profiles	5	300	**50.72**	
SPICE Two-Exposure mode		combi of 6 bright and faint lines	5	300	**2.86**	

LowLatency or Precursor programs

SPICE plans to run a mini-study before the start of each new study, that is configured exactly like the science study but has lower resolution/cadence/slit width/... and produces ~0.1MB.

Special datasets

Observing mode	Use Case/Target	Line List	Duration/dataset	Data Rate	Max time / orbit
SPICE Full Raster Scan		few strong lines	32	15.1	

Selection of SPICE spectral lines

Source: SPICE User Manual Iss 5.0 (Nov 2014)

Ion	Wavelength (Å)	Log T (K)	FIP (eV)	M/q
H I	1025	4.0	13.6	--
C II	1036	4.3	11.3	12.0
C III	977	4.5	11.3	6.0
O IV	787.7	5.2	13.6	5.3
O V	760	5.4	13.6	4.0
O VI	1032	5.5	13.6	3.2
S V	1037	5.5	13.6	3.2
Ne VI	786.5	5.2	10.36	8.0
Ne VII	1005	5.5	21.6	4.0
Ne VIII	973	5.6	21.6	3.3
Ne VIII	770	5.8	21.6	2.8
Mg VIII	772	5.9	7.7	3.4
Mg IX	706	6.0	7.7	3.0
Mg XI	997	6.2	7.7	2.4
Si VII	1049	5.6	8.1	4.8
Si XII	521 (2nd)	6.5	8.1	2.6
Fe X	1028	6.0	7.9	6.2
Fe XVIII	975	6.9	7.9	3.3
Fe XX	721	7.0	7.9	2.9

Auxiliary lines:

Ion	Wavelength (Å)	Log T (K)	FIP (eV)	M/q

Ne VIII	780	5.8	21.6	2.8
Si XII	499 (2nd)	6.5	8.1	2.6

Engineering modes & power consumption

Source: SPICE User Manual Iss 5.0 Sect 4.3 (Nov '14) & SPICE detailed budget report Iss 3.0 (July '13)

Average Power allocation for SPICE is **30W**

Mode	**Datarate: HK+LL+SCI (bps)**	**Avg Power consumption (Watts)**	**Peak Power consumption (Watts)**
OFF	0	0	0
STARTUP/BOOT	100	17.06	
STANDBY	100+0+0	22.45	
ENGINEERING	100+0+0	23.47	
OPERATE(*)	100 + <92 + see above	24-32 (TBC)	40.1 (TBC)