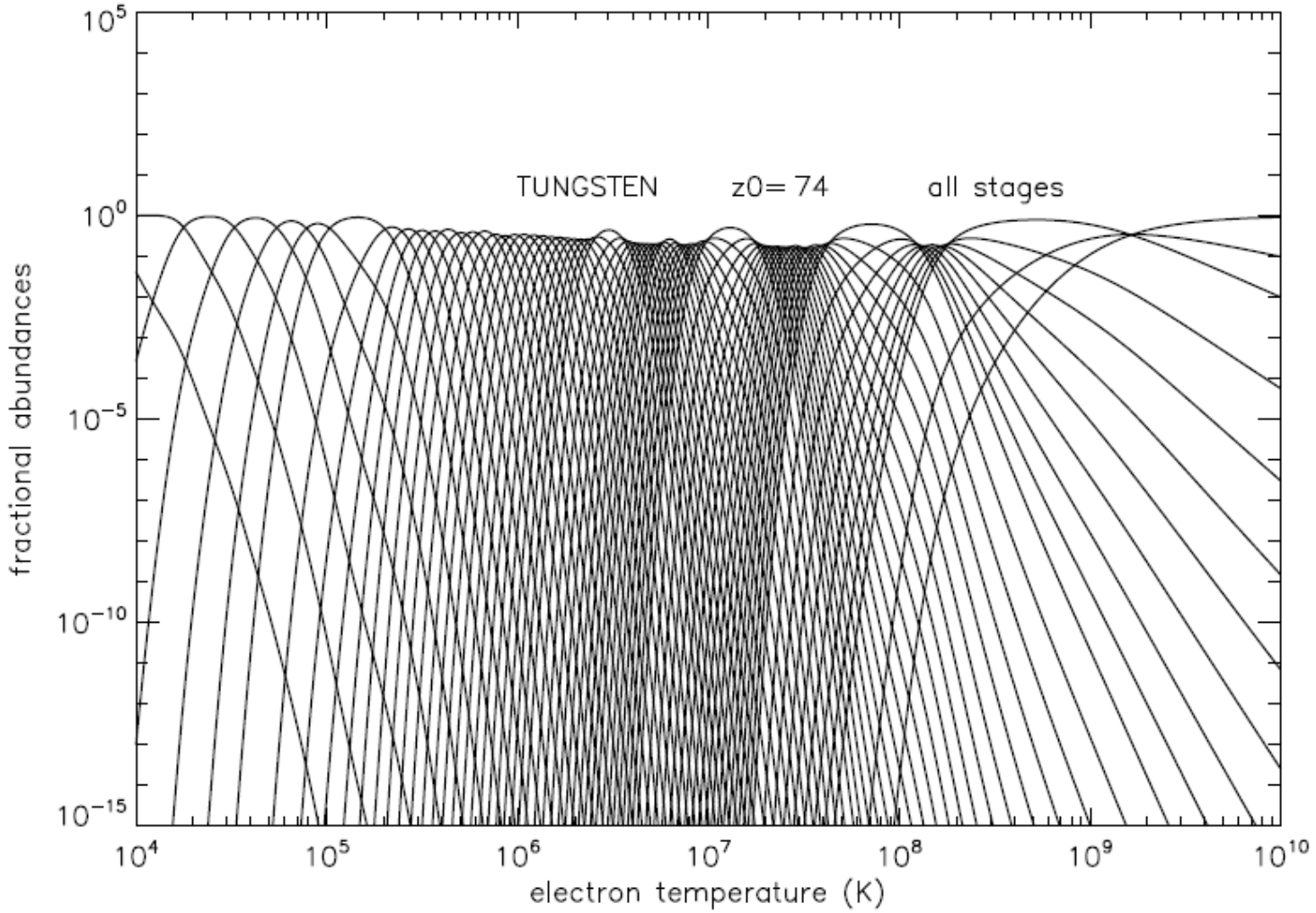
3b. The ionisation state of ions in a plasma – part 2

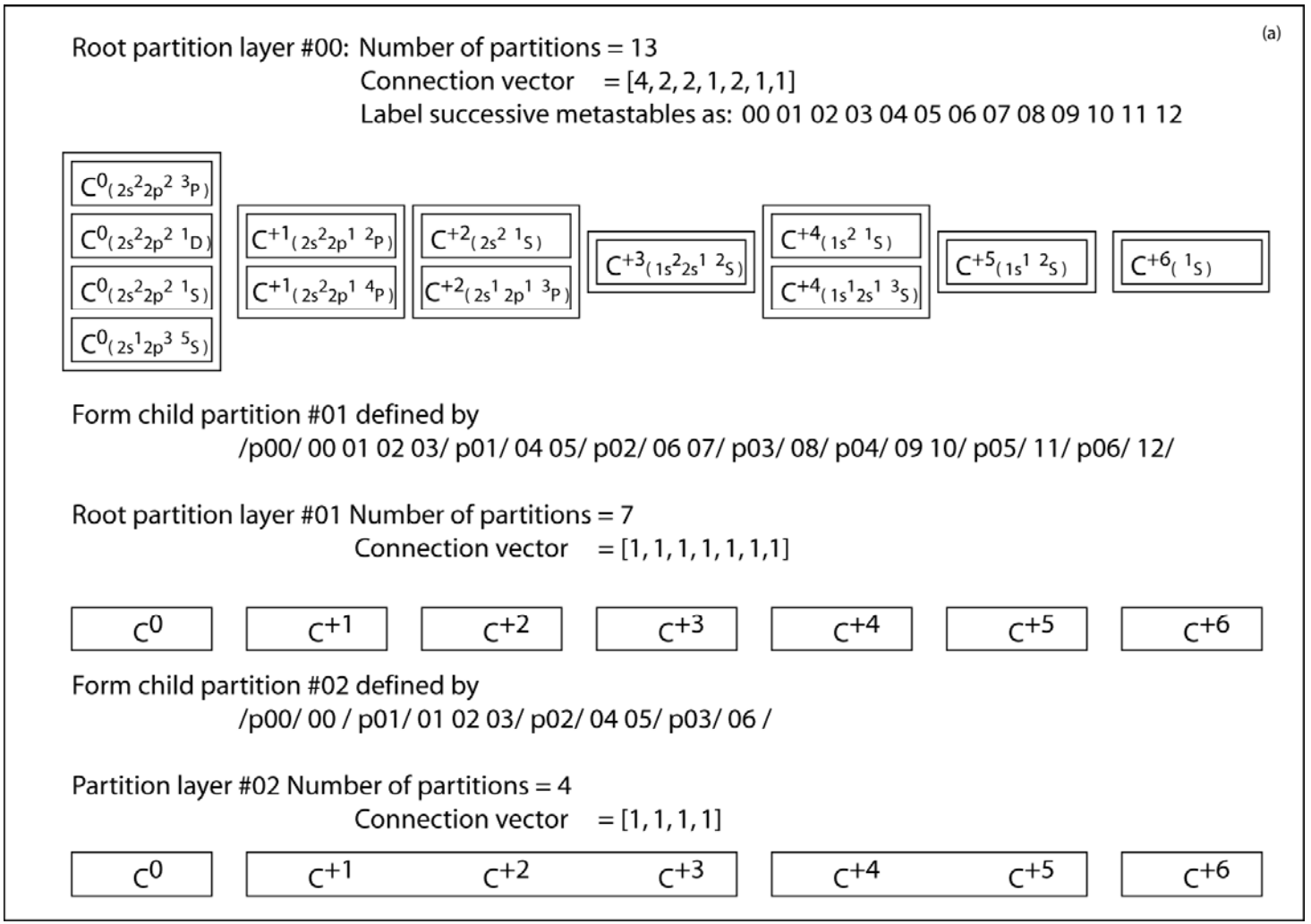
- Superstage compression
  - » Extension of the ADF11 data classes
  - » The root partitions and specification of a new partition
  - » ADAS416

- Setting up baseline ‘89’ ADF11 data for an element
  - » Using ADAS407 to obtain atomic parameter sets of format ADF03
  - » Using ADAS408 to produce ADF11 baseline data

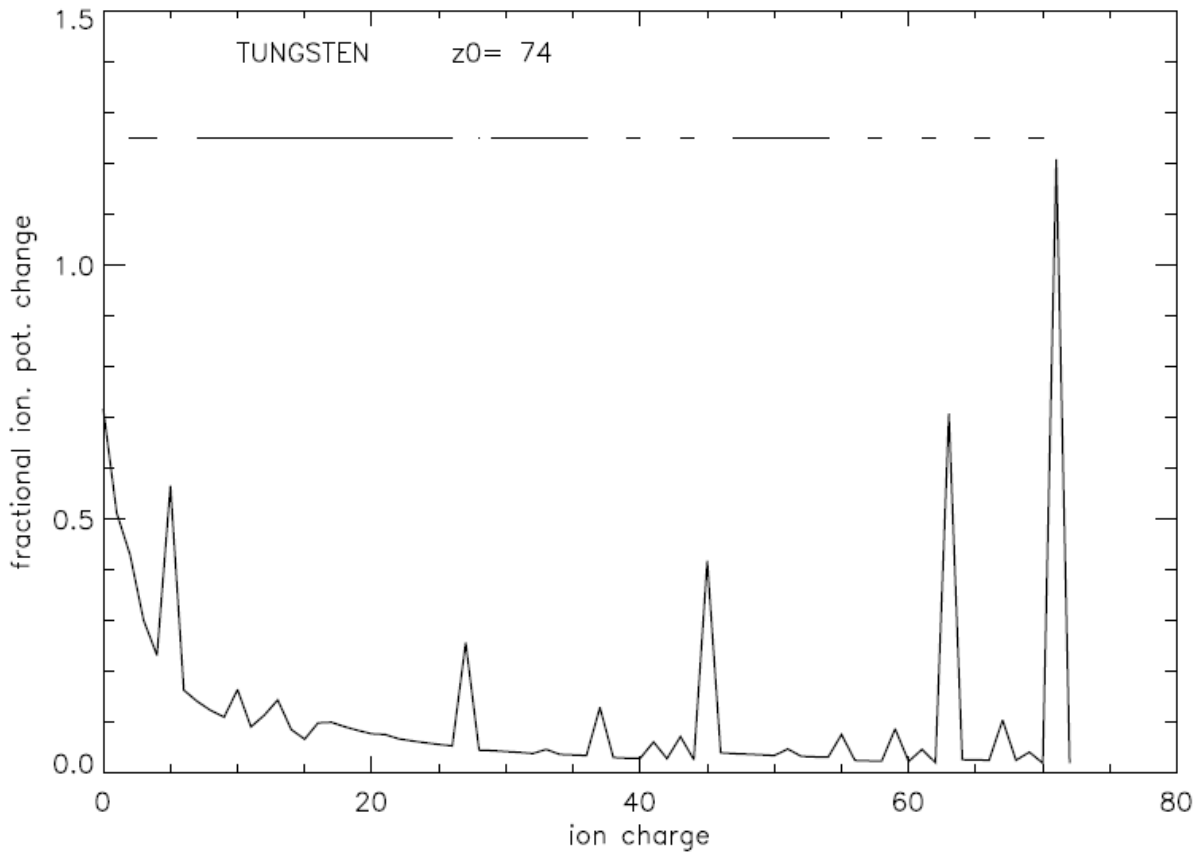
Stage to stage (unresolved root partition) ionisation balance for tungsten



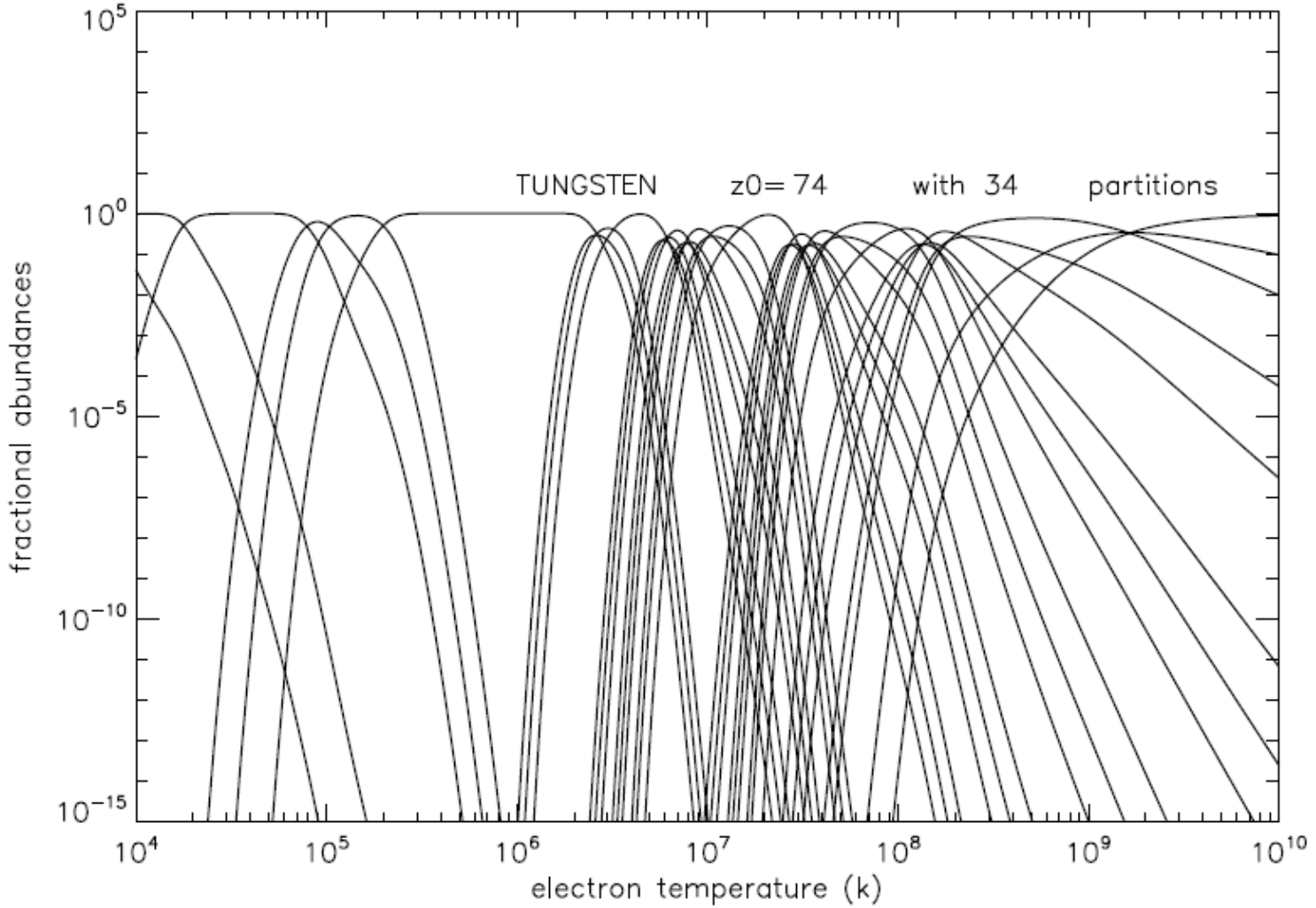
Main ideas based on carbon as an illustration



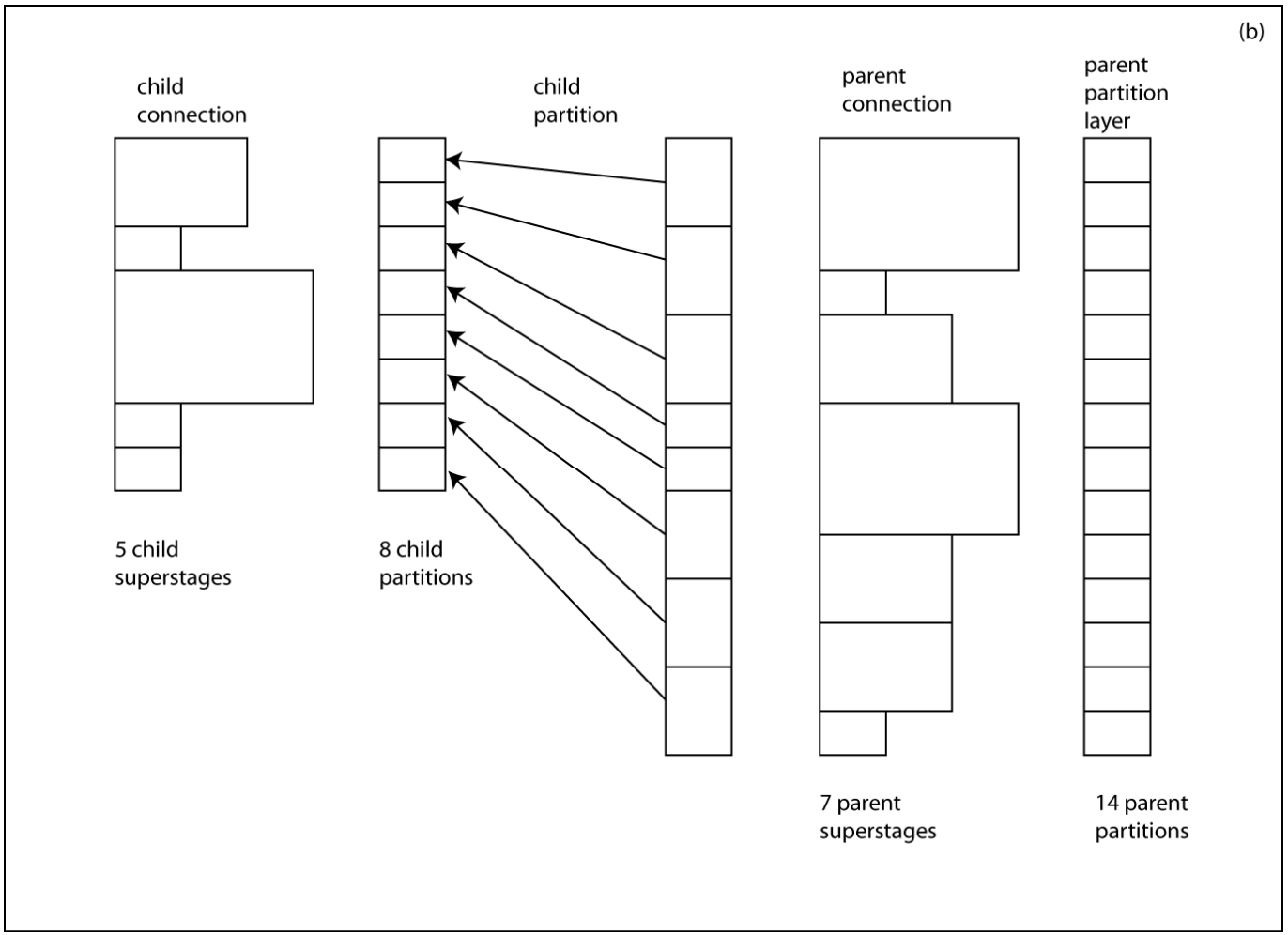
Superstages and partitions



Natural partition ionisation balance for tungsten



Partitioning



adf11 tungsten acd
an unresolved - #01 partition level

partition specification

```
 74    8   24    1    6     /TUNGSTEN      /ACD /GCR PROJECT
-------------------------------------------------------------------------------
//#02/p00/ 00 01/
      p01/ 02 03 04 05/
      p02/ 06 07 08 09 10 11 12/
      p03/ 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27/
      p04/ 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45/
      p05/ 46 47 48 49 50 51 52 53 54 55/
      p06/ 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74/
//#01/p00/ 00/p01/ 01/p02/ 02/p03/ 03/p04/ 04/p05/ 05/p06/ 06/p07/ 07/
      p08/ 08/p09/ 09/p10/ 10/p11/ 11/p12/ 12/p13/ 13/p14/ 14/p15/ 15/
      p16/ 16/p17/ 17/p18/ 18/p19/ 19/p20/ 20/p21/ 21/p22/ 22/p23/ 23/
      p24/ 24/p25/ 25/p26/ 26/p27/ 27/p28/ 28/p29/ 29/p30/ 30/p31/ 31/
      p32/ 32/p33/ 33/p34/ 34/p35/ 35/p36/ 36/p37/ 37/p38/ 38/p39/ 39/
      p40/ 40/p41/ 41/p42/ 42/p43/ 43/p44/ 44/p45/ 45/p46/ 46/p47/ 47/
      p48/ 48/p49/ 49/p50/ 50/p51/ 51/p52/ 52/p53/ 53/p54/ 54/p55/ 55/
      p56/ 56/p57/ 57/p58/ 58/p59/ 59/p60/ 60/p61/ 61/p62/ 62/p63/ 63/
      p64/ 64/p65/ 65/p66/ 66/p67/ 67/p68/ 68/p69/ 69/p70/ 70/p71/ 71/
      p72/ 72/p73/ 73/p74/ 74/
-------------------------------------------------------------------------------
  10.00000  10.67128  11.34256  12.01384  12.68513  13.35641  14.02769  14.69897
  -0.30103  -0.13086   0.03930   0.20947   0.37963   0.54980   0.71996   0.89013
   1.06030   1.23046   1.40063   1.57079   1.74096   1.91113   2.08129   2.25146
   2.42162   2.59179   2.76195   2.93212   3.10229   3.27245   3.44262   3.61278
---------------------/ ISPP= 1  / ISPB= 1  /--------/ S1= 1   / DATE= 12:09:05
 -11.64510 -11.66588 -11.69610 -11.71692 -11.74369 -11.74369 -12.74277 -12.74277
```

unresolved child partition level #02

adf11 format class extensions

class index		type content
1	acd	effective recombination coefficients
2	scd	effective ionisation coefficients
3	ccd	CX recombination coeffts
4	prb	recomb/brems power coeffts
5	prc	CX power coeffts
6*	qcd	base meta. coupl. coeffts
7*	xcd	parent metastable coupling coeffts
8	plt	low level line power coeffts
9	pls	representative line power coefficient
10	zcd	effective charge
11	ycd	effective squared charge
12	ecd	effective ionisation potential

* Only present with metastable resolved cases (1996 data)

Useful codes and procedures

- *preview_natural_partition.pro*

- *xxdata_11.for*, *xxdata_11.pro* and *read_adf11.pro* are all able to read the extended data classes and the partition information in the data sets

- The interactive series 4 code ADAS416 implements superstage compression and outputs a complete set of new (compressed) ADF11 datasets. See also

  run_adas416.pro

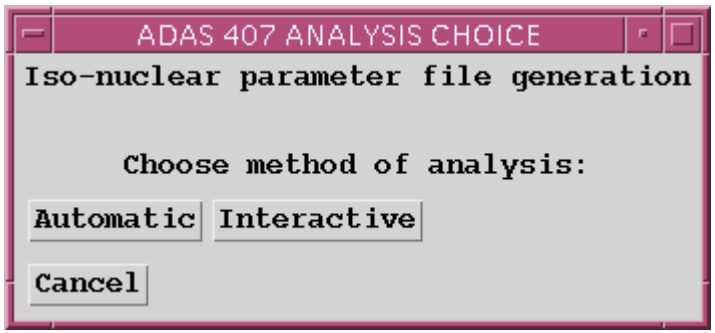
Preparing baseline ADF11 data

- The most basic ADAS calculation of stage to stage ADF11 datasets for an element uses codes ADAS407 and ADAS408.

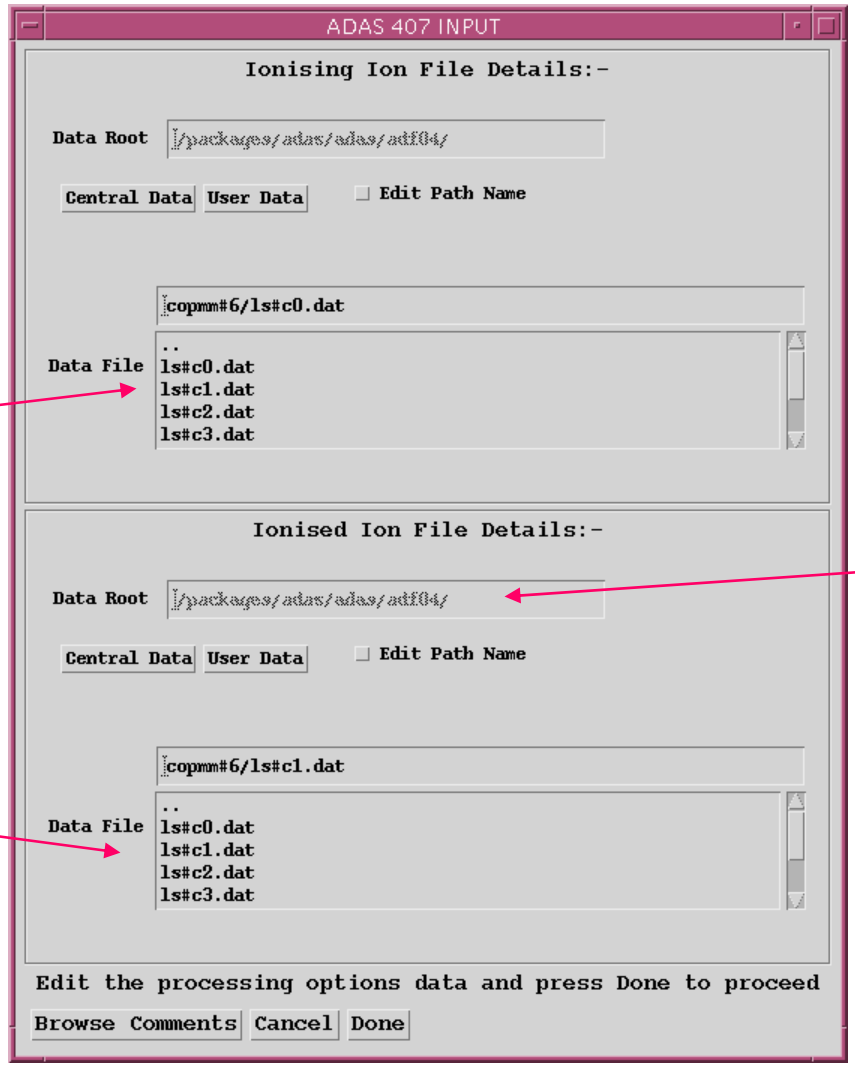
- ADAS407 processes mass produced ADF04 files for an element, extracting approximate form parameters (ADF03).

- ADAS408 uses ADF03 parameters to generate the ADF11 datasets.

ADAS407 Analysis Choice



ADAS407 Input

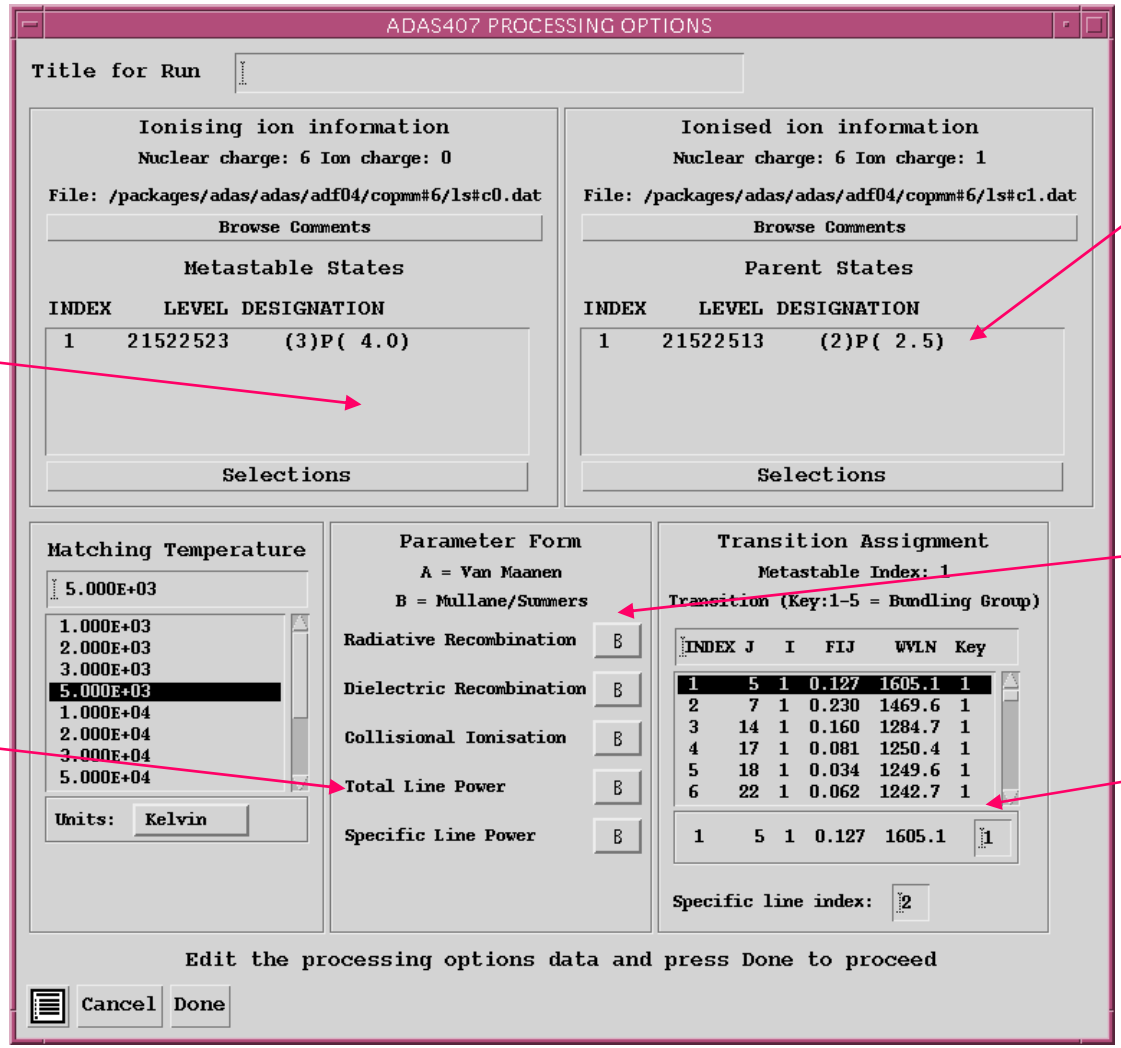


Choose adf04 file of ionising ion

Choose adf04 file of ionised stage

file name set automatically copss or copmm type

ADAS407 Processing



Specify metastables of ionising ion (just ground for baseline)

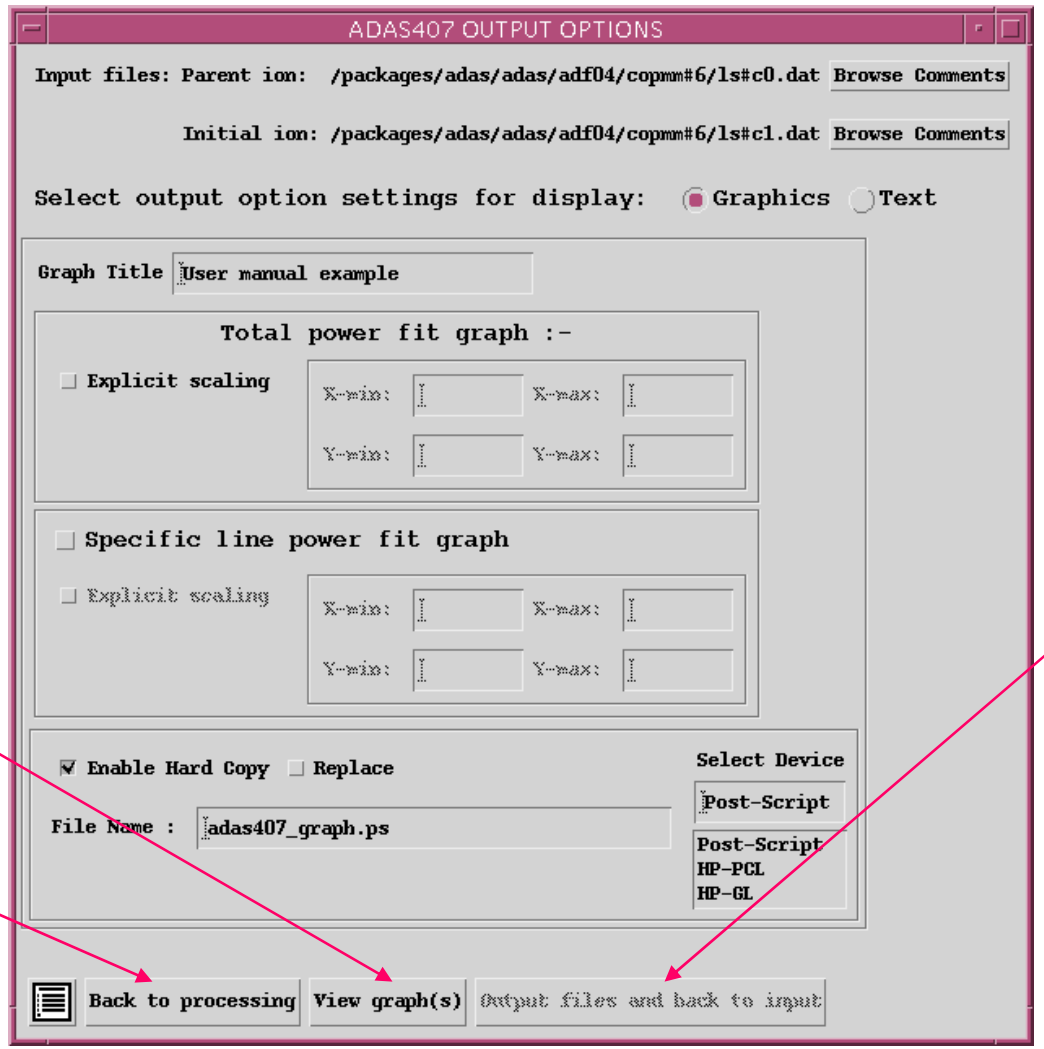
Specify metastables of ionised ion (just ground for baseline)

Select approx. forms

Set matching Te for power approx. fitting to exact power

Assign transitions to groups for approx. form fit.

ADAS407 Output-graphics

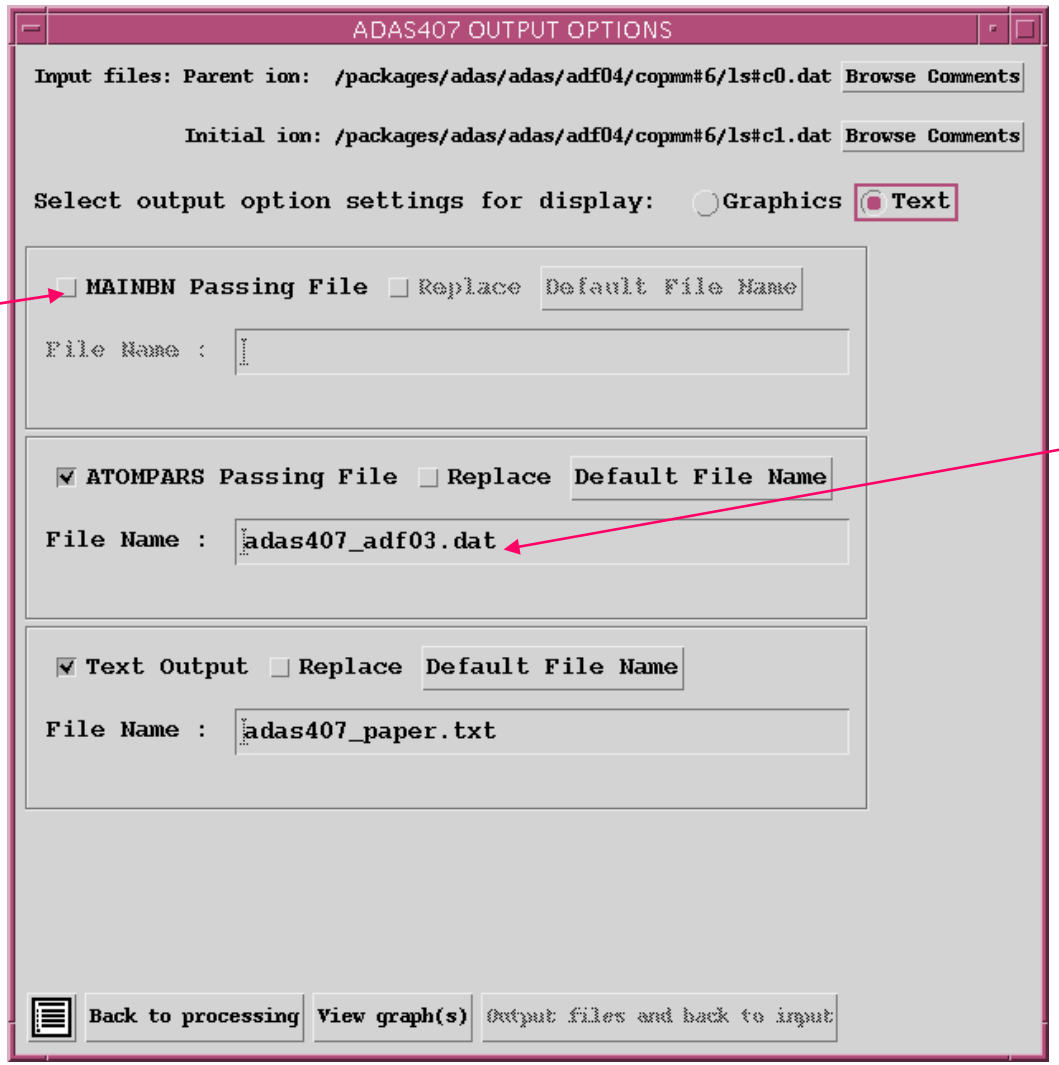


View graphs

View and reprocess to adjust fit

Finish up

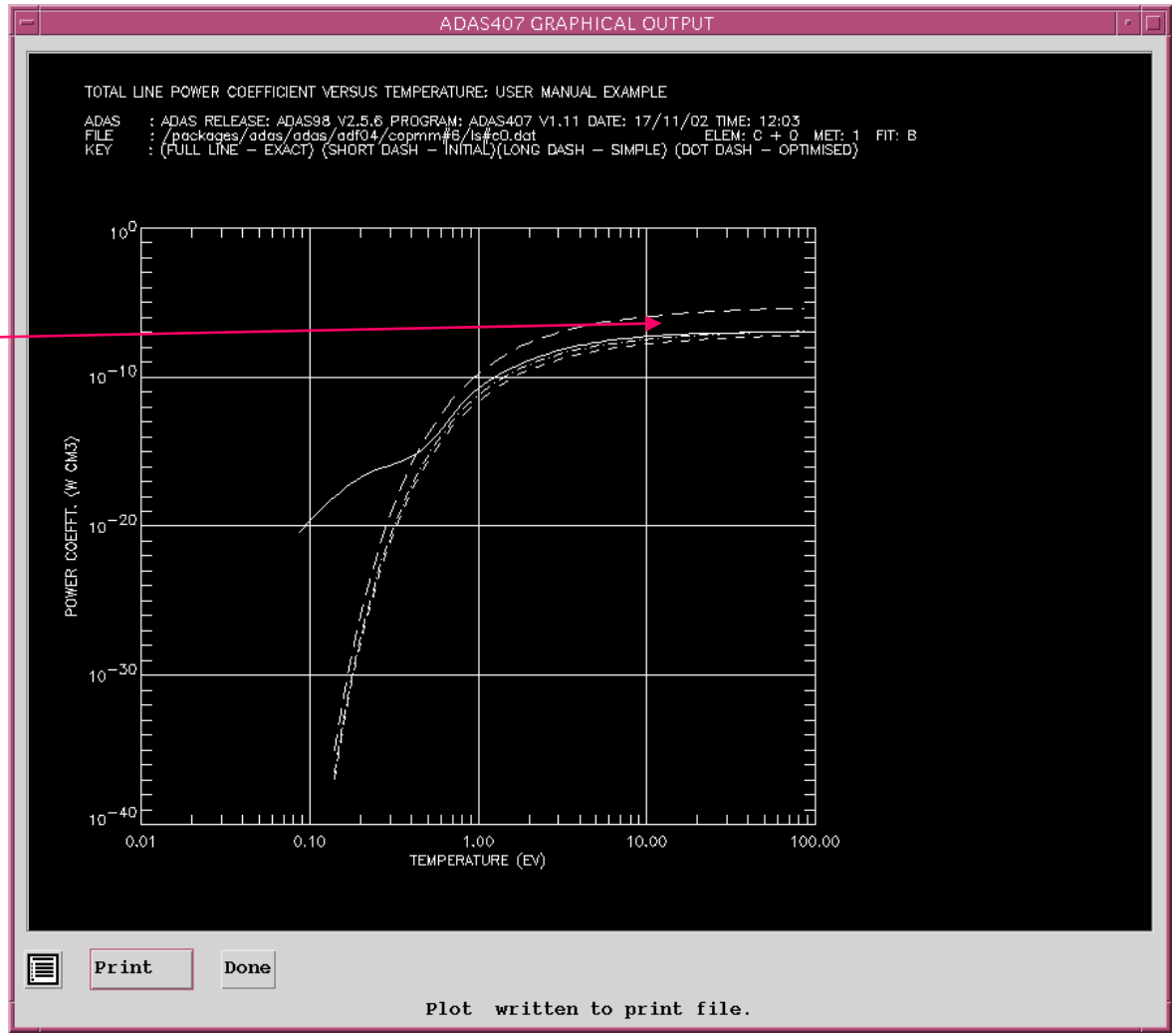
ADAS407 Output - text



Advanced option

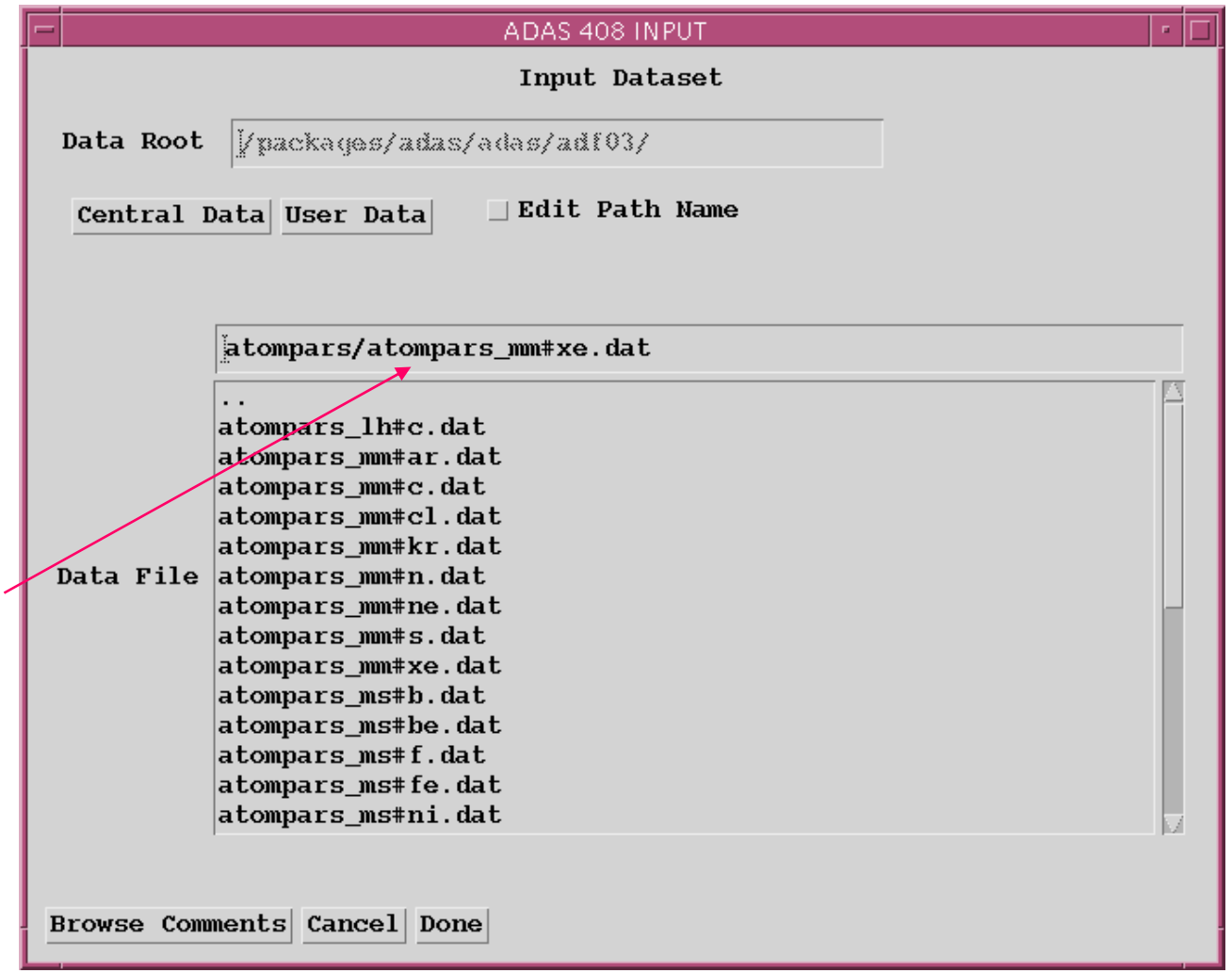
Parameter set output file

ADAS407 Graph



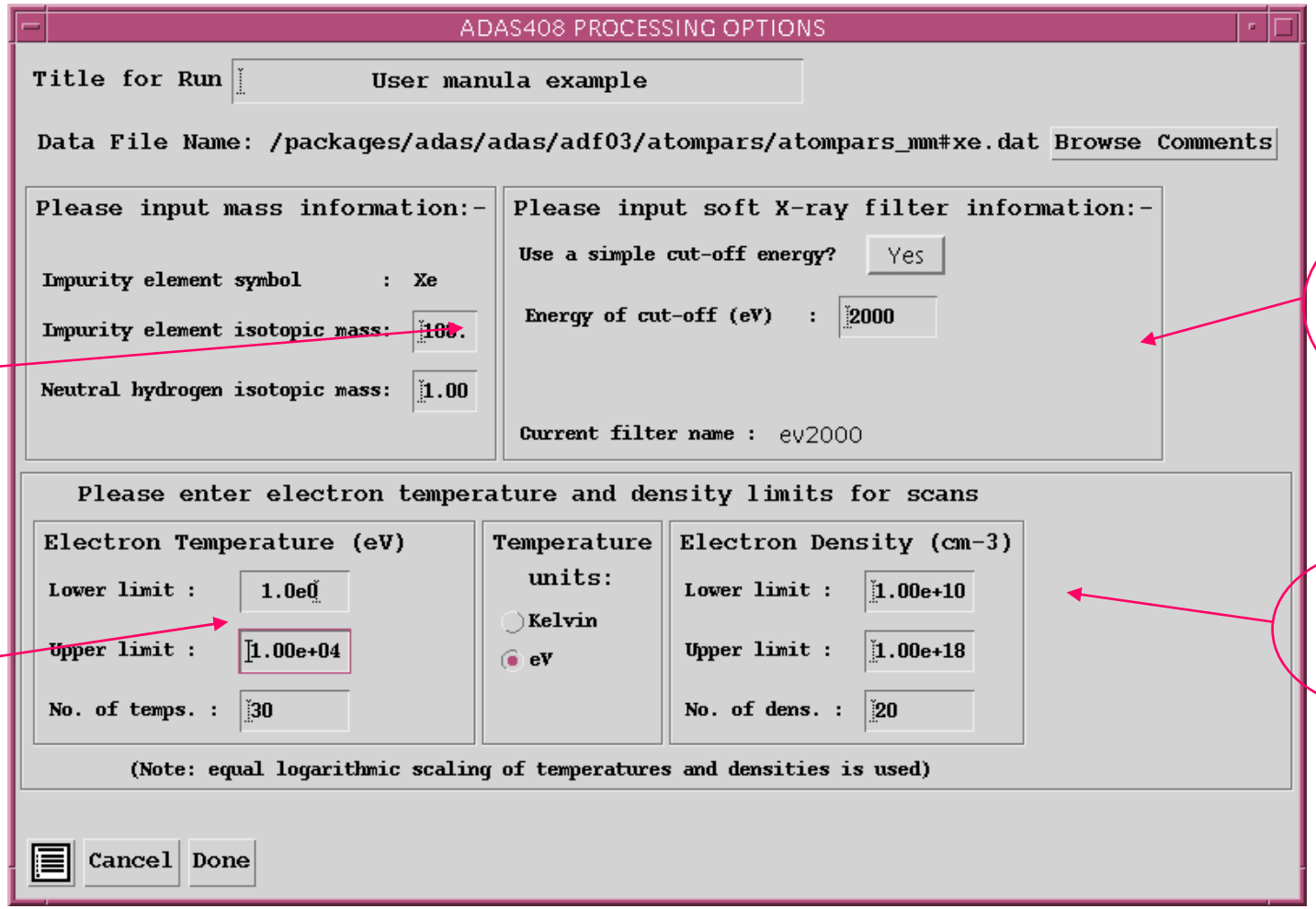
Matching point

ADAS408 Input



Select parameter file

ADAS408 Processing



Element ion range

Specify power filter

Temperature range

Density range

ADAS408 Output