URL: http://cxc.harvard.edu/ciao3.4/strong.html
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AHELP for CIAO 3.4

strong

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Synopsis

List "strong" emission lines at a given temperature, within specified wavelength bounds.

Syntax

```
strong(Temperature, [minEmissivity, minWavelength, maxWavelength])
```

Description

`strong' lists bright emission lines, their specific transition levels, and their approximate emissivity at the requested temperature. The default minimum emissivity is 1e−18 ph cm^3 / s. Only lines within the min and max wavelengths (in Angstroms) are printed; defuaults are 0 and 10^5 Angstroms. The method used for determining if a line will be above the minimum emissivity simply scales the emissivity from the peak value using the ratio of the ionization balance. This method is approximate; better values for the line emissivity at any temperature can be found in the ATOMDB. See also the GUIDE thread showing how to use GUIDE with grating data to identify and describe emission lines.

strong is a GUIDE routine, which must be initialized using the require("guide") command in chips or sherpa. GUIDE uses the optional ATOMDB database, and this command will fail if the ATOMDB is not available on your system. Although minEmissivity, minWavelength, and maxWavelength are optional, if minWavelength is provided a value for minEmissivity is also required, and if maxWavelength is given both minEmissivity and minWavelength are required.

Example 1

```
sherpa> require("guide")
GUIDE Initialized using ATOMDB v1.3.0
sherpa> strong(6.e6,1.e−16,10,40)
The listed "Approximate Emissivity" is scaled from the peak value
using the ratio of the ionization balance at the requested temperature
and the peak temperature for the line.

Approximate
Lambda −− Ion UL − LL Emissivity@ kT RelInt For More Info
```

```
Angstrom ph cm^3/s keV
12.1240 Fe XVII 71− 1 2.40e−16 @ 0.517 0.154 describe(26,17,71,1)
12.1321 Ne X 4− 1 3.02e−16 @ 0.517 0.194 describe(10,10,4,1)
12.1375 Ne X 3− 1 1.51e−16 @ 0.517 0.097 describe(10,10,3,1)
12.2660 Fe XVII 59− 1 2.17e−16 @ 0.517 0.139 describe(26,17,59,1)
13.5180 Fe XIX 68− 1 1.45e−16 @ 0.517 0.093 describe(26,19,68,1)
13.8250 Fe XVII 33− 1 1.69e−16 @ 0.517 0.109 describe(26,17,33,1)
14.2080 Fe XVIII 55− 1 2.74e−16 @ 0.517 0.175 describe(26,18,55,1)
14.2080 Fe XVIII 56− 1 5.01e−16 @ 0.517 0.321 describe(26,18,56,1)
14.3730 Fe XVIII 49− 1 1.97e−16 @ 0.517 0.126 describe(26,18,49,1)
14.5340 Fe XVIII 41− 1 1.49e−16 @ 0.517 0.096 describe(26,18,41,1)
15.0140 Fe XVII 27− 1 1.56e−15 @ 0.517 1.000 describe(26,17,27,1)
15.2610 Fe XVII 23− 1 4.42e−16 @ 0.517 0.283 describe(26,17,23,1)
15.6250 Fe XVIII 9− 1 1.58e−16 @ 0.517 0.101 describe(26,18,9,1)
16.0040 Fe XVIII 5− 1 1.86e−16 @ 0.517 0.119 describe(26,18,5,1)
16.0710 Fe XVIII 4− 1 2.28e−16 @ 0.517 0.146 describe(26,18,4,1)
16.7800 Fe XVII 5− 1 7.28e−16 @ 0.517 0.467 describe(26,17,5,1)
17.0510 Fe XVII 3− 1 8.63e−16 @ 0.517 0.553 describe(26,17,3,1)
17.0960 Fe XVII 2− 1 8.21e−16 @ 0.517 0.526 describe(26,17,2,1)
17.6230 Fe XVIII 29− 3 1.62e−16 @ 0.517 0.104 describe(26,18,29,3)
18.9671 O VIII 4− 1 4.04e−16 @ 0.517 0.259 describe(8,8,4,1)
18.9725 O VIII 3− 1 2.02e−16 @ 0.517 0.130 describe(8,8,3,1)
```

This command lists all emission lines emitted by a 6.e6 K plasma with emissivity greater than 1.e−16 ph cm^3 /s and wavelengths between 10 and 40 Angstroms.

Example 2

```
chips> require("guide")
GUIDE Initialized using ATOMDB v1.3.0
strong(1.e7)
The listed "Approximate Emissivity" is scaled from the peak value
using the ratio of the ionization balance at the requested temperature
and the peak temperature for the line.

Approximate
Lambda −− Ion UL − LL Emissivity@ kT RelInt For More Info
Angstrom ph cm^3/s keV
...
results omitted
...
```

List all emission lines from a 1e7 K plasma with emissivity greater than the default 1e18 ph cm^3 / s and wavelengths between 0 and 10^5 Angstroms. The extremely lengthy results are omitted for clarity.

Parameters

name	type	ftype	min	max	units	reqd
Temperature	float	input	1e4	1.e9	K	yes
Minimum Emissivity	float	input	1.e−20		ph cm^3/s	no
Minimum wavelength	float	input	0	1.e5	Angstroms	no
Maximum wavelength	float	input	0	1.e5	Angstroms	no

Detailed Parameter Descriptions

Parameter=Temperature (`float required filetype=input min=1e4 max=1.e9 units=K`)

The temperature of the plasma.

Parameter=Minimum Emissivity (`float not required filetype=input min=1.e−20 units=ph cm^3/s`)

The minimum line emissivity to output; lines with weaker emissivity are ignored.

Parameter=Minimum wavelength (`float not required filetype=input min=0 max=1.e5 units=Angstroms`)

The minimum line wavelength to output.

Parameter=Maximum wavelength (`float not required filetype=input min=0 max=1.e5 units=Angstroms`)

The maximum line wavelength to output.

Bugs

See the Sherpa bug pages online for an up−to−date listing of known bugs.

See Also

guide

describe, identify, ionbal, mdl2latex

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