spec_tools

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2.1 _csv< _T > Class Template Reference

This is the templated _csv class, initialized with double by default. STL parallel execution policy does not provide enhancements for simple operations.

`#include <csv.h>`

Public Types

- enum eVerbose { **QUIET**, **DEBUG** }
  Define verbosity values.

Public Member Functions

- _csv ()
  Default constructor without parameters. These parameters must be set after by methods. It will rise lot of errors if something is missing.
- _csv (const std::string &sFilename, const char &cSep)
  Constructor with two parameters such as the name of the working file and the separator character as usual with csv.
- _csv (const std::string &sFilename, const std::string &sSep)
- _csv (const std::vector< std::vector< _T > > &vvData)
  Constructor fed with external data.
- _csv (const std::vector< std::string > &vsHeader, const std::vector< std::vector< _T > > &vvData)
  Constructor fed with external header and data.
- _csv (const std::vector< std::string > &vsHeader, const std::vector< std::vector< _T > > &vvData, const char &cSep)
  Constructor fed with external header and data.
- bool read ()
  Read the content of the file given to the constructor using boost. It detects the header and data consistency with digit sequence: {0123456789eE+-. tab std::endl} and basic regex and dimension matching between header and data line. It is able to recover basic errors such as 'tab'==' '. The method put NaN in the grid if an unrecoverable error appends. Data will be store in private variables.
- bool show () const
  Show whole data, i.e. the header and data with no restriction on length or terminal size. It uses boost::format in order to correct spacing of number and strings.
- bool show (int iLine_stop) const

Show the header and data until "line_stop" line. Print all columns with terminal end-of-line. It uses boost::format in order to correct spacing of number and strings.

- bool write ()

  Write on disk what data are store.
- const std::vector< _T > select_line (int line) const

  Select the line "line" in data.
- const std::vector< _T > select_column (int iCol) const

  Select the column "col" in data.
- const std::vector< std::vector< _T > > select (int iLine_min, int iLine_max, int iCol_min, int iCol_max) const

  Select a sub grid in data, i.e. trim data to the rectangular $[i_{min}, i_{max}] \times [j_{min}, j_{max}]$.
- bool set_data (const std::vector< std::vector< _T > > &vvData)

  Set data with a vector of a vector.
- bool set_column (const std::vector< _T > &vCol, int iCol)

  Set a column with a vector.
- bool **set_row** (const std::vector< _T > &vRow, int iRow)
- bool set_header (const std::vector< std::string > &vsHeader)

  Set the header: the first line containing column name.
- bool set_filename (const std::string &sFilename)

  Set the filename for output or input. The fstream do not care about extension...
- bool set_filename_out (const std::string &sFilename)

  Set the filename for output. The fstream do not care about extension...
- bool set_separator (const char &cSep)

  Set the csv separator. Usually: '\t', ' ', ',', ';' ...
- bool set_separator (const std::string &sSep)

  Set the csv separator. Usually: '\t', ' ', ',', ';' ...
- void set_verbose (eVerbose evV)

  Set the verbose mode for debug. It does not deactivate error raising.
- const std::string get_filename () const

  Get the filename.
- const std::string get_filename_out () const

  Get the output filename.
- const char get_separator () const

  Get the separator.
- const size_t get_header_size () const

  Get size of the header.
- const size_t get_data_size_i () const

  Get data line size.
- const size_t get_data_size_j () const

  Get data column size.
- const std::vector< std::vector< _T > > & get_data () const

  Get data and return it as a vector of vector.
- const std::vector< std::string > & get_header () const

  Get column names and return it in a vector.
- bool empty () const

  Check if data are empty, and the emptiness of the first line, i.e. this->data[0].
- bool check_dim ()

  Check data dimension consistency, i.e. if all line dimensions are all equal.

- bool **genrandspec** (_T TMin, _T TMax, _T TStep)
- bool transform_lin (_T TA, _T TB, int iCol)

  Do Y=aX+b to the iCol-column.
- bool **shift** (_T TVal)
- bool **shift** (_T TVal, int iCol)
- bool apply_max_threshold (_T TVal)

  Delete i line from the grid where $\mathbf{data}[i][j] > val$.
- bool apply_min_threshold (_T TVal)

  Delete i line from the grid where $\mathbf{data}[i][j] < val$.
- bool apply_max_threshold (_T TVal, int iCol)

  Delete i line from the grid where $\mathbf{data}[i][j \neq list] > val$.
- bool apply_min_threshold (_T TVal, int iCol)

  Delete i line from the grid where $\mathbf{data}[i][j \neq list] < val$.
- void zeroize ()

  Set to zero data. One should find this useful...
- void clear ()

  Delete data and header.
- _csv & **operator=** (const _csv &other) const
- bool **operator==** (const _csv &other) const
- bool **operator!=** (const _csv &other) const
- _csv & operator+ (const _csv &other) const

  Sum with the 2nd column.
- _csv & operator+ (const _T &other) const

  Add a constant to the 2nd column.
- _csv & operator- (const _csv &other) const

  Sum with the 2nd column.
- _csv & operator- (const _T &other) const

  Substract a constant to the 2nd column.
- _csv & operator$*$ (const _csv &other) const

  Inner product with the 2nd column.
- _csv & operator$*$ (const _T &other) const

  Multiply by a constant the 2nd column.
- _csv & operator/ (const _csv &other) const

  Divide element by element the two columns.
- _csv & operator/ (const _T &other) const

  Divide by a non zero constant the 2nd column.

2.1.1 Detailed Description

template<typename _T = double>
class _csv< _T >

This is the templated _csv class, initialized with double by default. STL parallel execution policy does not provide enhancements for simple operations.

2.1.2 Constructor & Destructor Documentation

2.1.2.1 _csv() [1/6]

```
template<typename _T = double>
_csv< _T >::_csv ( )
```

Default constructor without parameters. These parameters must be set after by methods. It will rise lot of errors if something is missing.

Default constructor

2.1.2.2 _csv() [2/6]

```
template<typename _T = double>
_csv< _T >::_csv (
            const std::string & sFilename,
            const char & cSep )  [explicit]
```

Constructor with two parameters such as the name of the working file and the separator character as usual with csv.

Constructor

Parameters

sFilename	string Name of the input or output file with extension
cSep	char Separator char between column

2.1.2.3 _csv() [3/6]

```
template<typename _T = double>
_csv< _T >::_csv (
            const std::string & sFilename,
            const std::string & sSep )  [explicit]
```

Parameters

sFilename	string Name of the input or output file with extension
sSep	string Separator char between column

2.1.2.4 _csv() [4/6]

```
template<typename _T = double>
```

```
_csv< _T >::_csv (
            const std::vector< std::vector< _T > > & vvData )  [explicit]
```

Constructor fed with external data.

Parameters

vvData	the data

2.1.2.5 _csv() [5/6]

```
template<typename _T = double>
_csv< _T >::_csv (
            const std::vector< std::string > & vsHeader,
            const std::vector< std::vector< _T > > & vvData )  [explicit]
```

Constructor fed with external header and data.

Parameters

vsHeader	The vector of column name
vvData	the data

2.1.2.6 _csv() [6/6]

```
template<typename _T = double>
_csv< _T >::_csv (
            const std::vector< std::string > & vsHeader,
            const std::vector< std::vector< _T > > & vvData,
            const char & cSep )  [explicit]
```

Constructor fed with external header and data.

Parameters

vsHeader	the vector of column name
vvData	the data
cSep	char Separator char between column

2.1.3 Member Function Documentation

2.1.3.1 apply_max_threshold() [1/2]

```
template<typename _T = double>
bool _csv< _T >::apply_max_threshold (
            _T TVal )
```

Delete i line from the grid where $\mathbf{data}[i][j] > val$.

Parameters

TVal	The max threshold

Returns

true if all seems OK

2.1.3.2 apply_max_threshold() [2/2]

```
template<typename _T = double>
bool _csv< _T >::apply_max_threshold (
            _T TVal,
            int iCol )
```

Delete i line from the grid where $\mathbf{data}[i][j \neq list] > val$.

Parameters

TVal	The max threshold
iCol	Select a column

Returns

true if all seems OK

2.1.3.3 apply_min_threshold() [1/2]

```
template<typename _T = double>
bool _csv< _T >::apply_min_threshold (
            _T TVal )
```

Delete i line from the grid where $\mathbf{data}[i][j] < val$.

Parameters

TVal	The min threshold

Returns

true if all seems OK

2.1.3.4 apply_min_threshold() [2/2]

```
template<typename _T = double>
bool _csv< _T >::apply_min_threshold (
            _T TVal,
            int iCol )
```

Delete i line from the grid where $\mathbf{data}[i][j \neq list] < val$.

Parameters

TVal	The min threshold
iCol	Select a column

Returns

true if all seems OK

2.1.3.5 check_dim()

```
template<typename _T = double>
bool _csv< _T >::check_dim ( )
```

Check data dimension consistency, i.e. if all line dimensions are all equal.

Returns

true if dimensions seem OK

2.1.3.6 empty()

```
template<typename _T = double>
bool _csv< _T >::empty ( ) const
```

Check if data are empty, and the emptiness of the first line, i.e. this->data[0].

Returns

true if data are empty

2.1.3.7 get_data()

```
template<typename _T = double>
const std::vector< std::vector< _T > > & _csv< _T >::get_data ( ) const
```

Get data and return it as a vector of vector.

Returns

std::vector<std::vector<_T> >

2.1.3.8 get_data_size_i()

```
template<typename _T = double>
const size_t _csv< _T >::get_data_size_i ( ) const
```

Get data line size.

Returns

size_t

2.1.3.9 get_data_size_j()

```
template<typename _T = double>
const size_t _csv< _T >::get_data_size_j ( ) const
```

Get data column size.

Returns

size_t

2.1.3.10 get_filename()

```
template<typename _T = double>
const std::string _csv< _T >::get_filename ( ) const
```

Get the filename.

Returns

std::string

2.1.3.11 get_filename_out()

```
template<typename _T = double>
const std::string _csv< _T >::get_filename_out ( ) const
```

Get the output filename.

Returns

std::string

2.1.3.12 get_header()

```
template<typename _T = double>
const std::vector< _T > & _csv< _T >::get_header ( ) const
```

Get column names and return it in a vector.

Returns

std::vector<_T>

2.1.3.13 get_header_size()

```
template<typename _T = double>
const size_t _csv< _T >::get_header_size ( ) const
```

Get size of the header.

Returns

size_t

2.1.3.14 get_separator()

```
template<typename _T = double>
const char _csv< _T >::get_separator ( ) const
```

Get the separator.

Returns

char

2.1.3.15 read()

```
template<typename _T = double>
bool _csv< _T >::read ( )
```

Read the content of the file given to the constructor using boost. It detects the header and data consistency with digit sequence: {0123456789eE+-. tab std::endl} and basic regex and dimension matching between header and data line. It is able to recover basic errors such as 'tab'==' '. The method put NaN in the grid if an unrecoverable error appends. Data will be store in private variables.

Returns

true if all seems OK

2.1.3.16 select()

```
template<typename _T = double>
const std::vector< std::vector< _T > > & _csv< _T >::select (
            int iLine_min,
            int iLine_max,
            int iCol_min,
            int iCol_max ) const
```

Select a sub grid in data, i.e. trim data to the rectangular $[i_{min}, i_{max}] \times [j_{min}, j_{max}]$.

Parameters

iLine_min	upper line i_{min}
iLine_max	lower line i_{max}
iCol_min	left column j_{min}
iCol_max	right column j_{max}

Returns

std::vector<std::vector<_T> >

2.1.3.17 select_column()

```
template<typename _T = double>
const std::vector< _T > & _csv< _T >::select_column (
            int iCol ) const
```

Select the column "col" in data.

Parameters

iCol	The column to select

Returns

std::vector<_T>

2.1.3.18 select_line()

```
template<typename _T = double>
const std::vector< _T > & _csv< _T >::select_line (
            int iLine ) const
```

Select the line "line" in data.

Parameters

iLine	The line to select

Returns

std::vector<_T>

2.1.3.19 set_column()

```
template<typename _T = double>
bool _csv< _T >::set_column (
            const std::vector< _T > & vRow,
            int iRow )
```

Set a column with a vector.

Set a row with a vector.

Parameters

vCol	std::vector<_T> vCol
iCol	Select a column

Returns

true if all seems OK

Parameters

vRow	std::vector<_T> vRow
iRow	Select a row

Returns

true if all seems OK

2.1.3.20 set_data()

```
template<typename _T = double>
void _csv< _T >::set_data (
            const std::vector< std::vector< _T > > & vvData )
```

Set data with a vector of a vector.

Parameters

vvData	std::vector<std::vector<_T> > grid

Returns

true if all seems OK

2.1.3.21 set_filename()

```
template<typename _T = double>
bool _csv< _T >::set_filename (
            const std::string & sFilename )
```

Set the filename for output or input. The fstream do not care about extension...

Parameters

sFilename	The filename with extension or not.

Returns

true if all seems OK

2.1.3.22 set_filename_out()

```
template<typename _T = double>
bool _csv< _T >::set_filename_out (
            const std::string & sFilename )
```

Set the filename for output. The fstream do not care about extension...

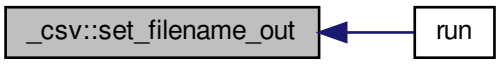
Parameters

sFilename	The filename with extension or not.

Returns

true if all seems OK

Here is the caller graph for this function:



2.1.3.23 set_header()

```
template<typename _T = double>
bool _csv< _T >::set_header (
            const std::vector< std::string > & vsHeader )
```

Set the header: the first line containing column name.

Parameters

vsHeader	string vector

Returns

true if all seems OK

2.1.3.24 set_separator() [1/2]

```
template<typename _T = double>
bool _csv< _T >::set_separator (
            const char & cSep )
```

Set the csv separator. Usually: '\t', ' ', ',', ';' ...

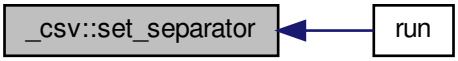
Parameters

cSep	The sep character: '\t' for tabulation

Returns

true if all seems OK

Here is the caller graph for this function:



2.1.3.25 set_separator() [2/2]

```
template<typename _T = double>
bool _csv< _T >::set_separator (
            const std::string & sSep )
```

Set the csv separator. Usually: '\t', ' ', ',', ';' ...

Todo

Parameters

sSep	The sep character: '\t' for tabulation

Returns

true if all seems OK

2.1.3.26 set_verbose()

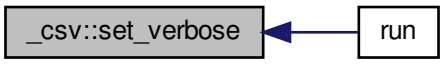
```
template<typename _T = double>
bool _csv< _T >::set_verbose (
            eVerbose evV )
```

Set the verbose mode for debug. It does not deactivate error raising.

Parameters

evV	eVerbose::DEBUG for verbose mode and eVerbose::QUIET to keep quiet

Here is the caller graph for this function:



2.1.3.27 show() [1/2]

```
template<typename _T = double>
void _csv< _T >::show ( ) const
```

Show whole data, i.e. the header and data with no restriction on length or terminal size. It uses boost::format in order to correct spacing of number and strings.

Returns

true if all seems OK

2.1.3.28 show() [2/2]

```
template<typename _T = double>
bool _csv< _T >::show (
            int iLine_stop ) const
```

Show the header and data until "line_stop" line. Print all columns with terminal end-of-line. It uses boost::format in order to correct spacing of number and strings.

Parameters

iLine_stop	The number of lines where stop the display

Returns

true if all seems OK

2.1.3.29 transform_lin()

```
template<typename _T = double>
bool _csv< _T >::transform_lin (
            _T TA,
            _T TB,
            int iCol )
```

Do Y=aX+b to the iCol-column.

Returns

true if all seems OK

2.1.3.30 write()

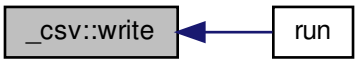
```
template<typename _T = double>
bool _csv< _T >::write ( )
```

Write on disk what data are store.

Returns

true if all seems OK

Here is the caller graph for this function:



The documentation for this class was generated from the following file:

- csv.h

2.2 _io< _T > Class Template Reference

The purpose of this class is only to provide methods to read ascii or FITS spectrum, and to convert vector to valarray.

`#include <waverage.hpp>`

Classes

- struct vec

  Define a (x,y) vector (seems better than std::pair)

Public Types

- typedef std::vector< std::valarray< std::valarray< _T > > > **Vvv**
- typedef std::valarray< std::valarray< _T > > **vv**

Public Member Functions

- **_io** (Vvv &VvvSpectr)
- bool read (std::string sFilename)
- bool read_dir (std::string sExtension)
- bool read_fits (std::string sFilename)
- bool **read_fits_dir** (std::string sExtension)
- bool **read_fits_dir** (std::string sDirectory, std::string sExtension)
- void show_data () const
- void show_data (int n) const
- void show_data (std::string sName) const
- bool write () const
- bool write (std::string sFilename) const
- void set_fileIn (std::string sFilename)
- void set_fileOut (std::string sFilename)
- void **set_data** (Vvv &VvvSpectr)
- void set_WaveScale (_T Scale)
- int get_FileIndex (std::string sName) const
- const std::vector< vec > get_vector () const
- const std::vector< std::vector< vec > > get_vectors () const
- const vv get_valarray ()
- const Vvv **get_valarrays** ()

2.2.1 Detailed Description

template<typename _T = double>
class _io< _T >

The purpose of this class is only to provide methods to read ascii or FITS spectrum, and to convert vector to valarray.

2.2.2 Member Function Documentation

2.2.2.1 get_FileIndex()

```
template<typename _T = double>
int _io< _T >::get_FileIndex (
            std::string sName ) const
```

return the position of sName in vsFileList

2.2.2.2 get_valarray()

```
template<typename _T = double>
const vv _io< _T >::get_valarray ( )
```

convert vector to an valarray

2.2.2.3 get_vector()

```
template<typename _T = double>
const std::vector<vec> _io< _T >::get_vector ( ) const
```

get spectrum

2.2.2.4 get_vectors()

```
template<typename _T = double>
const std::vector<std::vector<vec> > _io< _T >::get_vectors ( ) const
```

get spectra

2.2.2.5 read()

```
template<typename _T = double>
bool _io< _T >::read (
            std::string sFilename )
```

read one file

2.2.2.6 read_dir()

```
template<typename _T = double>
bool _io< _T >::read_dir (
            std::string sExtension )
```

read the whole directory, only need the extension of files

2.2.2.7 read_fits()

```
template<typename _T = double>
bool _io< _T >::read_fits (
            std::string sFilename )
```

convert fits to vectors

2.2.2.8 set_fileIn()

```
template<typename _T = double>
void _io< _T >::set_fileIn (
            std::string sFilename )
```

set the input file name

2.2.2.9 set_fileOut()

```
template<typename _T = double>
void _io< _T >::set_fileOut (
            std::string sFilename )
```

set the output name

2.2.2.10 set_WaveScale()

```
template<typename _T = double>
void _io< _T >::set_WaveScale (
            _T Scale )
```

multiply wavelength by Scale

2.2.2.11 show_data() [1/3]

```
template<typename _T = double>
void _io< _T >::show_data ( ) const
```

show a spectrum

2.2.2.12 show_data() [2/3]

```
template<typename _T = double>
void _io< _T >::show_data (
            int n ) const
```

show spectrum n

2.2.2.13 show_data() [3/3]

```
template<typename _T = double>
void _io< _T >::show_data (
            std::string sName ) const
```

show spectrum sName

2.2.2.14 write() [1/2]

```
template<typename _T = double>
bool _io< _T >::write ( ) const
```

write the results

2.2.2.15 write() [2/2]

```
template<typename _T = double>
bool _io< _T >::write (
            std::string sFilename ) const
```

write the results

The documentation for this class was generated from the following file:

- waverage.hpp

2.3 _log Class Reference

Public Member Functions

- _log (char **argv, const std::string &sFilename)

  Initialize with the first argument of the command line, and the log name.
- const std::string **get_execname** () const
- const std::string **get_logname** () const
- const std::string **get_historyname** () const
- bool **set_execname** (char **argv)
- bool **set_logname** (const std::string &sFilename)
- bool **set_historyname** (const std::string &sFilename)
- bool write (const std::string &sS)

  Write a string in the log file.
- bool **write** (const std::stringstream &ssS)
- bool write_history (const boost::program_options::variables_map &vm)

  Write history file with information from boost::program_options.
- bool remove_duplicate ()

  Remove duplicates in history file.

The documentation for this class was generated from the following files:

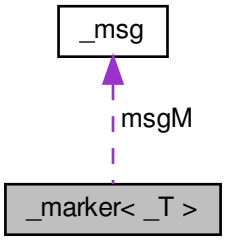
- log.h
- log.cpp

2.4 _marker< _T > Class Template Reference

A class to plot spectra with line markers using py matplotlib.

`#include <marker.h>`

Collaboration diagram for _marker< _T >:



Classes

- struct Line

  Define a line.

Public Types

- typedef std::vector< Line > **vlList**

Public Member Functions

- void **set_verbose** (const bool bVerbose)
- bool **set_data** (const std::vector< _T > &vTX, const std::vector< _T > &vTY)
- bool **set_title** (const std::string &sTitle)
- bool **set_label** (const std::string &sLabel)
- bool **set_xlabel** (const std::string &sXlabel)
- bool **set_ylabel** (const std::string &sYlabel)
- bool **set_xunit** (const std::string &sXunit)
- bool **set_yunit** (const std::string &sYunit)
- bool **set_output** (const std::string &sFilename)
- bool set_output (const std::string &sFilename, const int iDpi)

  Set the picture filename with the extension (png, pdf, jpeg...) and the density (iDpi>50)
- bool set_continuum (const _T TContinuum)

  Set the continuum position and therefore ymax. Default is y=1.
- bool set_supp (const _T TXmin, const _T TXmax)

Set the support of the first spectrum.

- bool **set_xmin** (const _T TXmin)
- bool **set_xmax** (const _T TXmax)
- bool **set_ymin** (const _T TYmin)
- bool **set_ymax** (const _T TYmax)
- bool **set_figsize** (int iHeight, int iWidth)
- void set_colorline (const std::string &sColor)

  Set the color of the first curve.
- bool **set_linewidth** (float fWidth)
- bool **set_titlesize** (int iSize)
- bool **set_labelsize** (int iSize)
- bool **set_ticklabelsize** (int iSize)
- bool set_annotatesize (int iSize)

  Set the font size of markers.
- bool **set_legendsize** (int iSize)
- void set_legend (bool bLegend)

  Enable or disable the legend.
- void set_halfbox (bool bHalfbox)

  Show only left and bottom axis.
- bool **set_continnumsize** (float fWidth)
- void **set_showgrid** (bool bShowgrid)
- void set_dotted (bool bDotted)

  Set secondary curves with dotted-style.
- void set_dotdashed (bool bDotdashed)

  Set secondary curves with dot-dashed-style.
- void set_wide (bool bWide)

  Define if the spectrum range is wide in order to reduce marker size with no overlaps.
- bool set_scriptname (const std::string &sScriptname)

  Set the name of the py script. Default is .plot.py.
- bool set_log (const std::string &sLog)

  Enable or disable log file. Default is .marker.log.
- bool add_line (_T TWl, const std::string &sName)

  Add a marker with a name on the figure.
- bool add_line (_T TWl, const std::string &sName, bool bBold)

  Add a marker with a name on the figure. bBold determines if the line must be highlighted.
- bool add_data (const std::vector< _T > &vTX, const std::vector< _T > &vTY)

  Add an additionnal spectrum which has to be plot.
- bool add_data (const std::vector< _T > &vTX, const std::vector< _T > &vTY, const std::string &sLabel)

  Add an additionnal spectrum which has to be plot.
- _T **get_continuum** () const
- const std::pair< _T, _T > get_supp ()

  Get the support of the first spectrum.
- const std::string & **get_scriptname** ()
- const std::string & **get_output** ()
- const std::string & **get_title** () const
- const std::string & **get_label** () const
- const std::string & **get_xlabel** () const
- const std::string & **get_xunit** () const

- const std::string & **get_ylabel** () const
- const std::string & **get_yunit** () const
- const std::pair< int, int > get_figsize () const

  Get the defined figsize, if defined. First: Height and Second: Width.
- int **get_dpi** () const
- bool make ()

  Write spectra, write script with markers.
- int plot ()

  Run the py script?

Static Public Member Functions

- static bool sort_elemlist (const std::string &sElemlist)

  Sort the elemlist.

Protected Attributes

- _msg msgM

2.4.1 Detailed Description

template<typename _T = float>
class _marker< _T >

A class to plot spectra with line markers using py matplotlib.

Todo marker(const _marker<_T>&)

2.4.2 Member Function Documentation

2.4.2.1 get_figsize()

```
template<typename _T = float>
const std::pair< int, int > _marker< _T >::get_figsize ( ) const
```

Get the defined figsize, if defined. First: Height and Second: Width.

Returns

std::pair of 2 int

2.4.2.2 get_supp()

```
template<typename _T = float>
const std::pair< _T, _T > _marker< _T >::get_supp ( )
```

Get the support of the first spectrum.

Returns

std::pair of 2 _T: [x_{min} x_{max}]

2.4.2.3 set_colorline()

```
template<typename _T = float>
void _marker< _T >::set_colorline (
            const std::string & sColor )
```

Set the color of the first curve.

Parameters

sColor	A string like "red", "green", "blue" or and a rgba hex string like "#rrggbbaa"

2.4.2.4 set_output()

```
template<typename _T = float>
bool _marker< _T >::set_output (
            const std::string & sFilename,
            const int iDpi )
```

Set the picture filename with the extension (png, pdf, jpeg...) and the density (iDpi>50)

Parameters

sFilename	Picture name
iDpi	Density

2.4.2.5 set_supp()

```
template<typename _T = float>
bool _marker< _T >::set_supp (
```

```
const _T TXmin,
const _T TXmax )
```

Set the support of the first spectrum.

Parameters

TXmin	x_{min}
TXmax	x_{max}

2.4.3 Member Data Documentation

2.4.3.1 msgM

```
template<typename _T = float>
_msg _marker< _T >::msgM  [protected]
```

Interface to print message to std output

The documentation for this class was generated from the following file:

- marker.h

2.5 _msg Class Reference

A class that sends string to std output and in a file...

```
#include <msg.h>
```

Public Types

- enum eMsg {
  START, **MID**, **END**, **ERROR**,
  THREADS }

  enum for method in order to define whether the message is at the begin, at the end or an error,

Public Member Functions

- **_msg** (const _msg &other)
- bool msg (const std::string &sMsg)

  Send a message with eMsg::MID as default.
- bool msg (eMsg emType, const std::string &sMsg)

  Send a message...
- bool error (const std::string &sMsg)

  Send an error message...
- template<typename ... Args>
  bool msg (const Args &...args)

  A variadic formatter method that indeed sends arbitratry number of variable to the std output... with eMsg::MID as default.
- template<typename ... Args>
  bool msg (eMsg emType, const Args &...args)

  A variadic formatter method that indeed sends arbitratry number of variable to the std output... The first parameter is always the enum eMsg.
- template<typename ... Args>
  bool error (const Args &...args)

  A variadic formatter method that indeed sends arbitratry number of variable to the std error output... with eMsg::ERROR as default.
- bool set_name (const std::string sName)

  Set the name of the main instance.
- bool set_threadname (const std::string sName)

  Set the name of threads.
- bool set_log (const std::string sLog)

  Enable or disable log file.
- void enable_log (bool bLog)

  Enable or disable the log file.

2.5.1 Detailed Description

A class that sends string to std output and in a file...

2.5.2 Member Function Documentation

2.5.2.1 msg()

```
bool _msg::msg (
            eMsg emType,
            const std::string & sMsg )
```

Send a message...

Parameters

emType	See enum eMsg::

The documentation for this class was generated from the following files:

- msg.h
- msg.cpp

2.6 _op< _T > Class Template Reference

This class is a set of spectrum manipulation methods. It is work with std::valarray. everything.

`#include <waverage.hpp>`

Public Types

- typedef std::vector< std::valarray< std::valarray< _T > > > **Vvv**
- typedef std::valarray< std::valarray< _T > > **vv**
- typedef std::vector< std::vector< _T > > **VV**

Public Member Functions

- **_op** (Vvv &VvvSpectr)
- bool resize_spectr ()
- bool rebuild_wlStep ()
- void remove_zero ()
- bool filter_SG (int n)
- bool filter_SG ()
- const vv compute_mean () const
- void compute_wmean ()
- std::pair< _T, _T > get_wlRange (int n) const
- std::pair< _T, _T > get_wlRangeMin () const
- void set_data (Vvv &VvvSpectr)
- bool write (_io< _T > &ioInterface)
- bool write_mean (std::string sFilename) const

2.6.1 Detailed Description

template<typename _T = double>
class _op< _T >

This class is a set of spectrum manipulation methods. It is work with std::valarray. everything.

2.6.2 Member Function Documentation

2.6.2.1 compute_mean()

```
template<typename _T = double>
const vv _op< _T >::compute_mean ( ) const
```

compute arithmetic mean

2.6.2.2 compute_wmean()

```
template<typename _T = double>
void _op< _T >::compute_wmean ( )
```

compute weighted arithmetic mean

2.6.2.3 filter_SG() [1/2]

```
template<typename _T = double>
bool _op< _T >::filter_SG (
            int n )  [inline]
```

Savitzky-Golay on spectrum n.

2.6.2.4 filter_SG() [2/2]

```
template<typename _T = double>
bool _op< _T >::filter_SG ( )
```

Savitzky-Golay on all spectra n.

2.6.2.5 get_wlRange()

```
template<typename _T = double>
std::pair<_T, _T> _op< _T >::get_wlRange (
            int n ) const
```

get the minimum and maximum wavelength

2.6.2.6 get_wlRangeMin()

```
template<typename _T = double>
std::pair<_T, _T> _op< _T >::get_wlRangeMin ( ) const
```

return the smallest support

2.6.2.7 rebuild_wlStep()

```
template<typename _T = double>
bool _op< _T >::rebuild_wlStep ( )
```

rebuild wavelength axis.

2.6.2.8 remove_zero()

```
template<typename _T = double>
void _op< _T >::remove_zero ( )
```

trim spectra where flux is 0 (assuming zeros are at the beginning or the end).

2.6.2.9 resize_spectr()

```
template<typename _T = double>
bool _op< _T >::resize_spectr ( )
```

resize all spectra to the same size (maximal).

2.6.2.10 set_data()

```
template<typename _T = double>
void _op< _T >::set_data (
            Vvv & VvvSpectr )
```

set external spectra.

2.6.2.11 write()

```
template<typename _T = double>
bool _op< _T >::write (
            _io< _T > & ioInterface )
```

write the data using a _io class.

2.6.2.12 write_mean()

```
template<typename _T = double>
bool _op< _T >::write_mean (
            std::string sFilename ) const
```

write only the w mean.

The documentation for this class was generated from the following file:

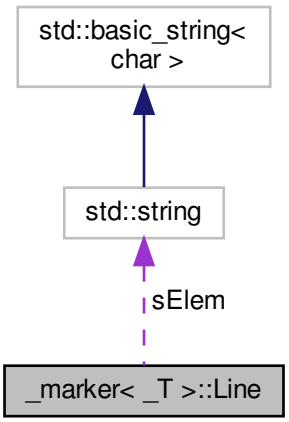
- waverage.hpp

2.7 _marker< _T >::Line Struct Reference

Define a line.

`#include <marker.h>`

Collaboration diagram for _marker< _T >::Line:



Public Attributes

- _T **TWI**
- std::string **sElem**
- bool **bBold**

2.7.1 Detailed Description

template<typename _T = float>
struct _marker< _T >::Line

Define a line.

The documentation for this struct was generated from the following file:

- marker.h

2.8 _io< _T >::vec Struct Reference

Define a (x,y) vector (seems better than std::pair)

```
#include <waverage.hpp>
```

Public Attributes

- _T **x**
- _T **y**
- _T **SNR** =-1

2.8.1 Detailed Description

template<typename _T = double>
struct _io< _T >::vec

Define a (x,y) vector (seems better than std::pair)

The documentation for this struct was generated from the following file:

- waverage.hpp

3 File Documentation

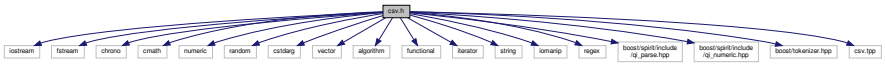
3.1 csv.h File Reference

A basic class for csv manipulation.

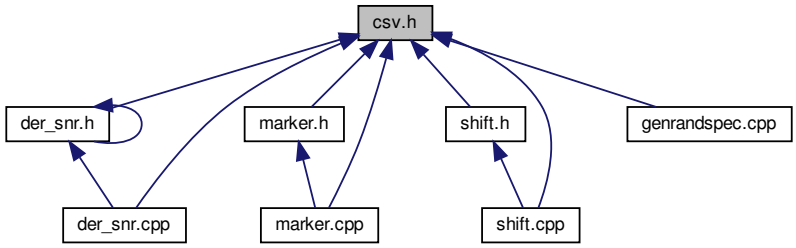
```
#include <iostream>
#include <fstream>
#include <chrono>
#include <cmath>
#include <numeric>
#include <random>
#include <cstdarg>
#include <vector>
#include <algorithm>
#include <functional>
#include <iterator>
#include <string>
#include <iomanip>
#include <regex>
#include <boost/spirit/include/qi_parse.hpp>
#include <boost/spirit/include/qi_numeric.hpp>
#include <boost/tokenizer.hpp>
```

```
#include "csv.tpp"
```

Include dependency graph for csv.h:



This graph shows which files directly or indirectly include this file:



Classes

- class _csv< _T >

  This is the templated _csv class, initialized with double by default. STL parallel execution policy does not provide enhancements for simple operations.

3.1.1 Detailed Description

A basic class for csv manipulation.

Author

Audric Lemonnier

Version

0.9

Date

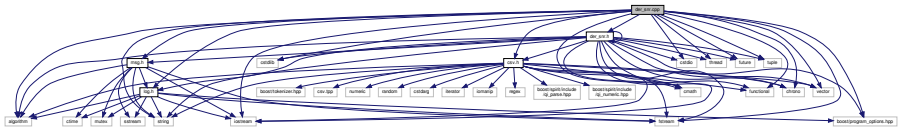
07/04/2020

3.2 der_snr.cpp File Reference

An C++ implementation of the der_snr fortran code from: F. Stoehr et al: DER_SNR: A Simple & General Spectroscopic Signal-to-Noise Measurement Algorithm,
394, Astronomical Data Analysis Software and Systems (ADASS) XVII
2008ASPC..394..505S.

```
#include <iostream>
#include <cstdlib>
#include <cstdio>
#include <fstream>
#include <vector>
#include <algorithm>
#include <string>
#include <cmath>
#include <functional>
#include <thread>
#include <future>
#include <tuple>
#include <chrono>
#include <boost/program_options.hpp>
#include <csv.h>
#include <msg.h>
#include <log.h>
#include <der_snr.h>
```

Include dependency graph for der_snr.cpp:



Functions

- int **main** (int argc, char ∗∗argv)

3.2.1 Detailed Description

An C++ implementation of the der_snr fortran code from: F. Stoehr et al: DER_SNR: A Simple & General Spectroscopic Signal-to-Noise Measurement Algorithm,
394, Astronomical Data Analysis Software and Systems (ADASS) XVII
2008ASPC..394..505S.

Remove value under a threshold in a folder or in a file. This code is multi-threaded or not if not available.

Author

Audric Lemonnier

Version

0.2

Date

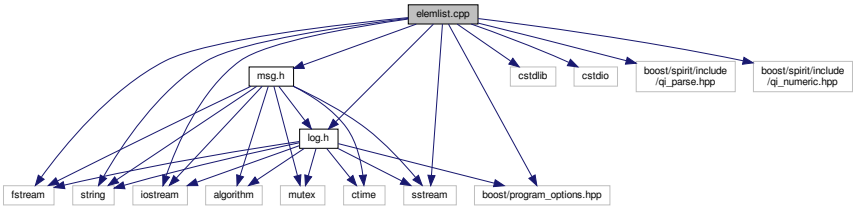
18/04/2020

3.3 elemlist.cpp File Reference

Add a line to the elemlist.

```
#include <iostream>
#include <cstdlib>
#include <cstdio>
#include <fstream>
#include <string>
#include <sstream>
#include <boost/program_options.hpp>
#include <boost/spirit/include/qi_parse.hpp>
#include <boost/spirit/include/qi_numeric.hpp>
#include <msg.h>
#include <log.h>
```

Include dependency graph for elemlist.cpp:



Macros

- #define LOGFILE ".elemlist.log"
- #define HISTFILE ".history"

Functions

- template<typename _T = std::string>
  bool add_elem (const std::string &sElem, _T TWI, const std::string &sFilename)

  Add a line to a file.
- template<typename _T = std::string>
  bool add_elem (const std::string &sSymbol, const std::string &sElem, _T TWI, const std::string &sFilename)

  Add a line to a file, with the indicator symbol.
- bool is_float (const std::string &sVal)

  Determine if a string is a number.
- int **main** (int argc, char **argv)

3.3.1 Detailed Description

Add a line to the elemlist.

Author

Audric Lemonnier

Version

0.1

Date

30/03/2020

3.3.2 Macro Definition Documentation

3.3.2.1 HISTFILE

```
#define HISTFILE ".history"
```

Define the default histfile (shared)

3.3.2.2 LOGFILE

```
#define LOGFILE ".elemlist.log"
```

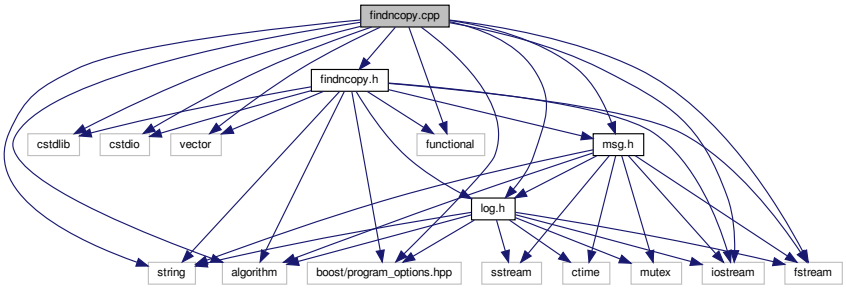
Define the default logfile

3.4 findncopy.cpp File Reference

Copy files from a list in a new folder.

```
#include <iostream>
#include <cstdlib>
#include <cstdio>
#include <fstream>
#include <vector>
#include <string>
#include <algorithm>
#include <functional>
#include <boost/program_options.hpp>
#include <msg.h>
#include <log.h>
```

`#include <findncopy.h>`
Include dependency graph for findncopy.cpp:



Macros

- #define LOGFILE ".findncopy.log"
- #define HISTFILE ".history"

Functions

- int **main** (int argc, char **argv)

3.4.1 Detailed Description

Copy files from a list in a new folder.

Author

Audric Lemonnier

Version

0.1

Date

09/03/2020

3.4.2 Macro Definition Documentation

3.4.2.1 HISTFILE

```
#define HISTFILE ".history"
```

Define the default histfile (shared)

3.4.2.2 LOGFILE

```
#define LOGFILE ".findncopy.log"
```

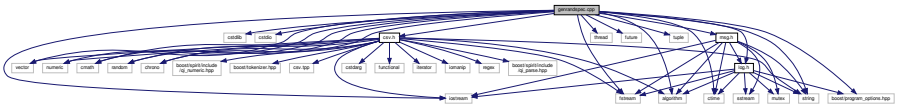
Define the default logfile

3.5 genrandspec.cpp File Reference

Generate a set of randomized-flux spectra between two wavelengths for test purposes.

```
#include <iostream>
#include <cstdlib>
#include <cstdio>
#include <fstream>
#include <vector>
#include <algorithm>
#include <numeric>
#include <string>
#include <cmath>
#include <random>
#include <thread>
#include <future>
#include <ctime>
#include <tuple>
#include <chrono>
#include <boost/program_options.hpp>
#include <csv.h>
#include <msg.h>
#include <log.h>
```

Include dependency graph for genrandspec.cpp:



Macros

- #define LOGFILE ".genrandspec.log"
- #define HISTFILE ".history"
- #define MaxFilepDir 10

  Set the maximum number of files to create in a folder.

Functions

- void run (const std::string &sOutput, char cSep, float fMinw, float fMaxw, float fStep)
  Write random spectra on disk.
- double long **CPU_utilization** ()
- std::tuple< double long, double long > **get_stat** ()
- int **main** (int argc, char **argv)

3.5.1 Detailed Description

Generate a set of randomized-flux spectra between two wavelengths for test purposes.

Author

Audric Lemonnier

Version

0.4

Date

18/04/2020

3.5.2 Macro Definition Documentation

3.5.2.1 HISTFILE

```
#define HISTFILE ".history"
```

Define the default histfile (shared)

3.5.2.2 LOGFILE

```
#define LOGFILE ".genrandspec.log"
```

Define the default logfile

3.5.2.3 MaxFilepDir

```
#define MaxFilepDir 10
```

Set the maximum number of files to create in a folder.

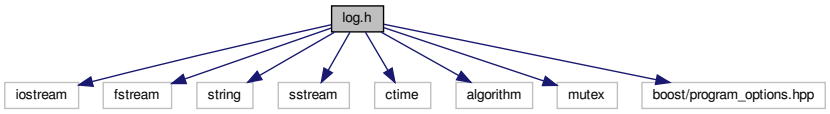
MaxFilepDir

3.6 log.h File Reference

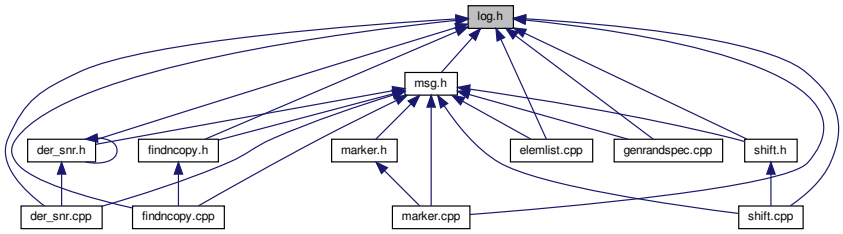
A class to write log file.

```
#include <iostream>
#include <fstream>
#include <string>
#include <sstream>
#include <ctime>
#include <algorithm>
#include <mutex>
#include <boost/program_options.hpp>
```

Include dependency graph for log.h:



This graph shows which files directly or indirectly include this file:



Classes

- class _log

3.6.1 Detailed Description

A class to write log file.

Author

Audric Lemonnier

Version

0.1

Date

03/05/2020

3.7 marker.cpp File Reference

Highlight lines on spectrum.

```
#include <iostream>
#include <cstdlib>
#include <cstdio>
#include <fstream>
#include <vector>
#include <tuple>
#include <string>
#include <algorithm>
#include <iterator>
#include <limits>
#include <boost/program_options.hpp>
#include <boost/spirit/include/qi_parse.hpp>
#include <boost/spirit/include/qi_numeric.hpp>
#include <marker.h>
#include <msg.h>
#include <log.h>
#include <csv.h>
```

Include dependency graph for marker.cpp:

Macros

- #define LOGFILE ".marker.log"
- #define HISTFILE ".history"

Functions

- int **main** (int argc, char ∗∗argv)

3.7.1 Detailed Description

Highlight lines on spectrum.

Author

Audric Lemonnier

Version

0.6

Date

29/04/2020

3.7.2 Macro Definition Documentation

3.7.2.1 HISTFILE

```
#define HISTFILE ".history"
```

Define the default histfile (shared)

3.7.2.2 LOGFILE

```
#define LOGFILE ".marker.log"
```

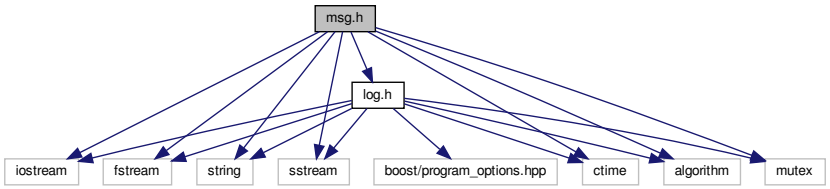
Define the default logfile

3.8 msg.h File Reference

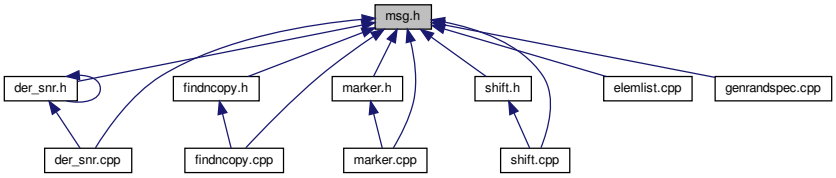
A class to print and write message.

```
#include <iostream>
#include <fstream>
#include <string>
#include <sstream>
#include <ctime>
#include <algorithm>
#include <mutex>
#include <log.h>
```

Include dependency graph for msg.h:



This graph shows which files directly or indirectly include this file:



Classes

- class _msg

  A class that sends string to std output and in a file...

3.8.1 Detailed Description

A class to print and write message.

Author

Audric Lemonnier

Version

0.2

Date

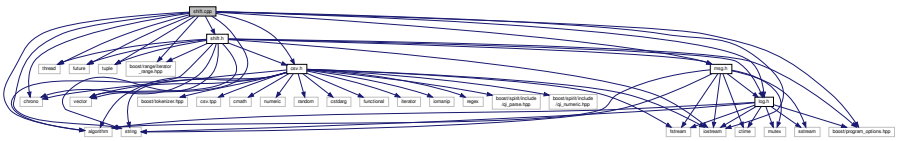
18/04/2020

3.9 shift.cpp File Reference

Shift whole spectrum by a given wavelength. This code is multi-threaded or not if not available.

```
#include <iostream>
#include <vector>
#include <algorithm>
#include <thread>
#include <future>
#include <string>
#include <tuple>
#include <chrono>
#include <boost/program_options.hpp>
#include <boost/range/iterator_range.hpp>
#include <csv.h>
#include <msg.h>
#include <log.h>
#include <shift.h>
```

Include dependency graph for shift.cpp:



Macros

- #define **CLIGHT** 299792.458
- #define LOGFILE ".shift.log"
- #define HISTFILE ".history"

Functions

- int **main** (int argc, char **argv)

3.9.1 Detailed Description

Shift whole spectrum by a given wavelength. This code is multi-threaded or not if not available.

Author

Audric Lemonnier

Version

0.3

Date

18/04/2020

3.9.2 Macro Definition Documentation

3.9.2.1 HISTFILE

```
#define HISTFILE ".history"
```

Define the default histfile (shared)

3.9.2.2 LOGFILE

```
#define LOGFILE ".shift.log"
```

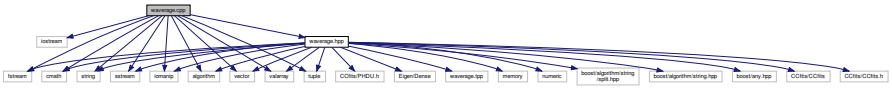
Define the default logfile

3.10 waverage.cpp File Reference

Compute average of spectra from FITS weighted by the SNR or the exposition time.

```
#include <iostream>
#include <fstream>
#include <cmath>
#include <string>
#include <sstream>
#include <iomanip>
#include <algorithm>
#include <vector>
#include <valarray>
#include <tuple>
#include <waverage.hpp>
```

Include dependency graph for waverage.cpp:



Functions

- int **main** (int argc, char ∗∗argv)

3.10.1 Detailed Description

Compute average of spectra from FITS weighted by the SNR or the exposition time.

Author

Audric Lemonnier

Version

0.0

Date

16/07/2020

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