

spec_tools

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1 Todo List

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

Parsing command line to get folder name and csv separator, for example.

2 Class Documentation

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` ()
This is the 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)
This is the constructor with two parameters such as the name of the working file and the separator character as usual with csv.
- `_csv` (const std::vector< std::vector< _T > > &vvData)
This is the constructor fed with external data.
- `_csv` (const std::vector< std::string > &vsHeader, const std::vector< std::vector< _T > > &vvData)
This is the constructor fed with external header and data.
- `_csv` (const std::vector< std::string > &vsHeader, const std::vector< std::vector< _T > > &vvData, const char &cSep)
This is the 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: {0123456789e+-, 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', ' ', ';;', ';' ...
 - 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 int `get_header_size` () const
Get size of the header.
 - const int `get_data_size_i` () const
Get data line size.
 - const int `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)
Generate a normalized random spectrum with random gaussian absorption profiles. For TStep < 0.05, you may want to initialize with double.
 - 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 `data[i][j] > val`.
 - bool `apply_min_threshold` (_T TVal)
Delete i line from the grid where `data[i][j] < val`.

- bool `apply_max_threshold` (_T TVal, int iCol)
Delete i line from the grid where `data[i][j] ≠ list` > val.
- bool `apply_min_threshold` (_T TVal, int iCol)
Delete i line from the grid where `data[i][j] ≠ list` < val.
- void `zeroize` ()
Set to zero data. One should find this useful...
- void `clear` ()
Delete data and header.
- `_csv` (_csv &other)
- `_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
Subtract 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()` [1/5] `template<typename _T = double>`
`_csv<_T>::_csv ()`

This is the 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()` [2/5] `template<typename _T = double>`

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

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

Constructor

Parameters

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

2.1.2.3 `_csv()` [3/5] `template<typename _T = double>`

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

This is the constructor fed with external data.

Parameters

<i>vvData</i>	The data
---------------	----------

2.1.2.4 `_csv()` [4/5] `template<typename _T = double>`

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

This is the constructor fed with external header and data.

Parameters

<i>vsHeader</i>	The vector of column name
<i>vvData</i>	The data

2.1.2.5 `_csv()` [5/5] `template<typename _T = double>`

```
_csv<_T>::_csv (
    const std::vector< std::string > & vsHeader,
```

```
const std::vector< std::vector< _T > > & vvData,  
const char & cSep ) [explicit]
```

This is the constructor fed with external header and data.

Parameters

<i>vsHeader</i>	The vector of column name
<i>vvData</i>	The data
<i>cSep</i>	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 `data[i][j] > val`.

Parameters

<i>TVal</i>	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 `data[i][j \neq list] > val`.

Parameters

<i>TVal</i>	The max threshold
<i>iCol</i>	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 `data[i][j] < val`.

Parameters

<i>TVal</i>	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 `data[i][j ≠ list] < val`.

Parameters

<i>TVal</i>	The min threshold
<i>iCol</i>	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 int _csv< _T >::get_data_size_i () const`

Get data line size.

Returns

int

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

Get data column size.

Returns

int

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 int _csv<_T>::get_header_size () const`

Get size of the header.

Returns

`int`

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

Get the separator.

Returns

char

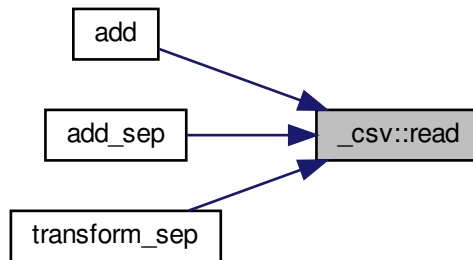
2.1.3.15 read() `template<typename _T = double>`
`bool _csv<_T>::read ()`

Read the content of the file given to the constructor using boost. It detects the header and data consistency with digit sequence: {0123456789e+-, 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

Here is the caller graph for this function:



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

<i>iLine_min</i>	upper line i_{min}
<i>iLine_max</i>	lower line i_{max}
<i>iCol_min</i>	left column j_{min}
<i>iCol_max</i>	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

<i>iCol</i>	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

<i>iLine</i>	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

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

Returns

true if all seems OK

Parameters

<i>vRow</i>	std::vector<_T> vRow
<i>iRow</i>	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

<i>vvData</i>	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

<code>sFilename</code>	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

<code>sFilename</code>	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

<i>vsHeader</i>	string vector
-----------------	---------------

Returns

true if all seems OK

2.1.3.24 set_separator() `template<typename _T = double>`

```
bool _csv< _T >::set_separator (
    const char & cSep )
```

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

Parameters

<i>cSep</i>	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_verbose()** `template<typename _T = double>`

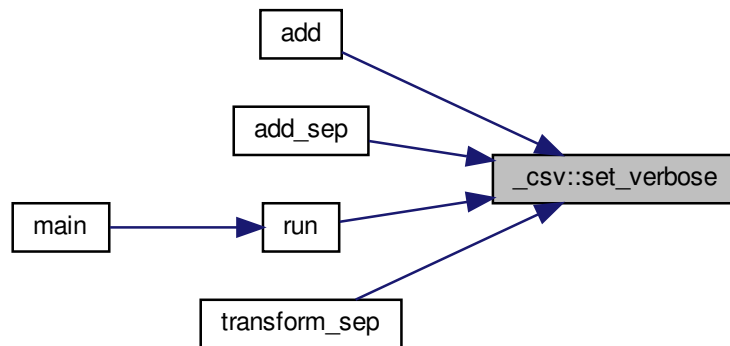
```
bool _csv< _T >::set_verbose (
    eVerbose evV )
```

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

Parameters

<code>evV</code>	<code>eVerbose::DEBUG</code> for verbose mode and <code>eVerbose::QUIET</code> to keep quiet
------------------	--

Here is the caller graph for this function:



2.1.3.26 `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

2.1.3.27 `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

<i>iLine_stop</i>	The line number where stop the display
-------------------	--

Returns

true if all seems OK

2.1.3.28 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

2.1.3.29 write() `template<typename _T = double>`

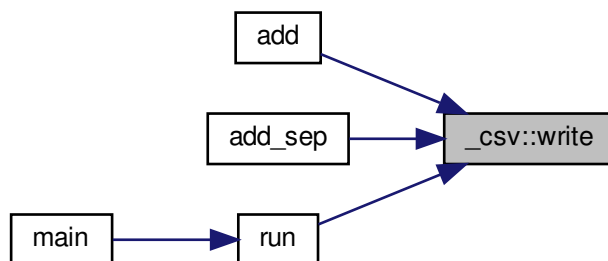
```
bool _csv<_T>::write ( )
```

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 `_msg` Class Reference

A class that sends string to std output...

```
#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)
- void `msg` (const std::string &sMsg) const
Send a message with eMsg::MID as default.
- void `msg` (`eMsg` emType, const std::string &sMsg) const
Send a message...
- void `error` (const std::string &sMsg) const
Send an error message...
- template<typename ... Args>
void `msg` (const Args &...args) const
A variadic formatter method that indeed sends arbitrary number of variable to the std output... with eMsg::MID as default.
- template<typename ... Args>
void `msg` (`eMsg` emType, const Args &...args) const
A variadic formatter method that indeed sends arbitrary number of variable to the std output... The first parameter is always the enum eMsg.
- template<typename ... Args>
void `error` (const Args &...args) const
A variadic formatter method that indeed sends arbitrary number of variable to the std error output... with eMsg::ERROR as default.
- void `set_name` (const std::string sName)
Set the name of the main instance.
- void `set_threadname` (const std::string sName)
Set the name of threads.

2.2.1 Detailed Description

A class that sends string to std output...

2.2.2 Member Function Documentation

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

Send a message...

Parameters

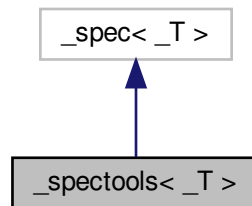
<i>emType</i>	See enum eMsg::
---------------	--------------------

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

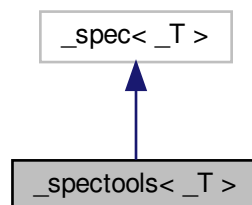
- msg.h
- msg.cpp

2.3 `_spectools<_T>` Class Template Reference

Inheritance diagram for `_spectools<_T>`:



Collaboration diagram for `_spectools<_T>`:



Public Member Functions

- `_spectools` (const `spectools` &other)
- `_spectools` & `operator=` (const `_spectools` &other)

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

- `spectools.h`

2.4 `_spectra` Class Reference

Public Member Functions

- `_spectra` (const `_spectra` &other)
- `_spectra` & `operator=` (const `_spectra` &other)
- bool `operator==` (const `_spectra` &other) const
- bool `operator!=` (const `_spectra` &other) const

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

- `spectra.h`

3 File Documentation

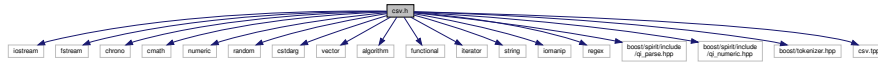
3.1 `csv.h` File Reference

A basic class for csv manipulation.

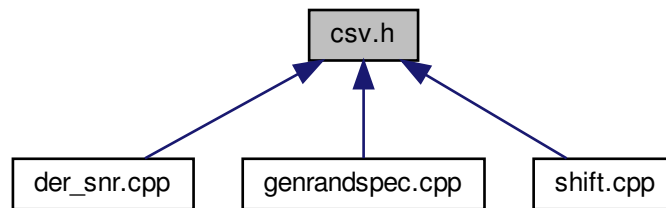
```
#include <iostream>
#include <fstream>
#include <chrono>
#include <cmath>
#include <numeric>
#include <random>
#include <cstdint>
#include <vector>
#include <algorithm>
#include <functional>
#include <iterator>
#include <string>
#include <iomanip>
#include <regex>
#include <boost/spirit/include/qi_parse.hpp>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

Macros

- `#define PARALLEL_EXEC`

3.1.1 Detailed Description

A basic class for csv manipulation.

Author

Audric Lemonnier

Version

0.8

Date

17/03/2020

Compute the S/N with der_snr method.

- double **der_snr** (const std::vector< double > &vFlux)
- float **median** (const std::vector< float > &vFlux)

Simple computation of the median.

- double **median** (const std::vector< double > &vFlux)
- int **main** (int argc, char **argv)

This code removes zeros and negative values in csv located in "./data". The maximum of thread has been used to accelerate code.

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 This code is multi-threaded or not if not available.

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

0.1

Date

16/03/2020

3.2.2 Function Documentation

3.2.2.1 main()

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

This code removes zeros and negative values in csv located in "./data". The maximum of thread has been used to accelerate code.

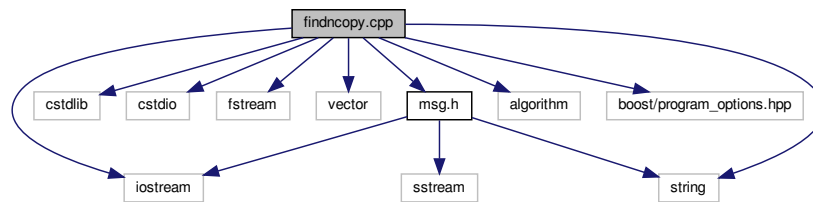
Todo Parsing command line to get folder name and csv separator, for example.

3.3 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 <boost/program_options.hpp>
#include "msg.h"
```

Include dependency graph for findncopy.cpp:



Functions

- `std::vector< std::string > parse_filelist (std::fstream &flux)`
Create a vector of strings from the filelist.
- `std::vector< std::string > get_fullrpath (std::vector< std::string > &vsFilelist, const fs::path &fspPidir)`
Get the full relative path of all file.
- `std::vector< std::string > get_fullrpath (std::vector< std::string > &vsFilelist, const fs::path &fspPidir, const std::string &sExclude)`
Get the full relative path of all file and exclude a string in paths.
- `void erase_string (std::vector< std::string > &vsFullrpath, const std::string &sToerase)`
Erase a string pattern in the path list.
- `std::vector< std::string > make_dir_list (const fs::path &fspPath, const std::string &sDirbase)`
Make a list of the folder structure.
- `void make_dir (const std::vector< std::string > &vsBaserpath, const std::string &sOfolder)`
Recreate the folder structure.
- `void copy_file (std::vector< std::string > &vsFullrpath, const std::string &sOfolder, const std::string &sIfolder)`
Copy the found files.
- `int main (int argc, char **argv)`

3.3.1 Detailed Description

Copy files from a list in a new folder.

Author

Audric Lemonnier

Version

0.1

Date _____

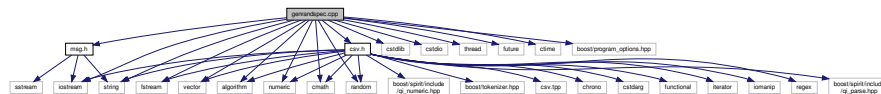
09/03/2020

3.4 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 <boost/program_options.hpp>
#include "csv.h"
#include "msg.h"
```

Include dependency graph for genrandspec.cpp:



Macros

- #define MaxFileDir 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.
- int **main** (int argc, char **argv)

3.4.1 Detailed Description

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

Author

Audric Lemonnier

Version

0.3

Date _____

17/03/2020

3.4.2 Macro Definition Documentation

3.4.2.1 MaxFileDir `#define MaxFileDir 10`

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

```
\define MaxFilepDir
```

3.5 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 <boost/program_options.hpp>
#include <boost/range/iterator_range.hpp>
#include "csv.h"
#include "msg.h"
```

Include dependency graph for shift.cpp:



Macros

- `#define CLIGHT 299792458`

Functions

- void `add` (const std::vector< std::string > &vsList, float fWavelength)
Add the defined wavelength to the first column of spectra. Default sep is 't'.
- void `add_sep` (const std::vector< std::string > &vsList, char cSep, float fWavelength)
Add the defined wavelength to the first column of spectra.
- void `transform_sep` (const std::vector< std::string > &vsList, char cSep, float fVr)
Correct the radial velocity effect on spectra. Perform a linear transformation.
- int `main` (int argc, char **argv)

3.5.1 Detailed Description

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

Author

Audric Lemonnier

Version

0.2

Date

16/03/2020

3.5.2 Function Documentation

3.5.2.1 transform_sep() void transform_sep (
 const std::vector< std::string > & vsList,
 char cSep,
 float fVr)

Correct the radial velocity effect on spectra. Perform a linear transformation.

Parameters

<code>fVr</code>	Radial Velocity
------------------	-----------------

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