TU_cxx

- C++ re-implementation of (some of) the functionality of the TrueUniverse python library:
    - catalogue_lib.py
    - sed_lib.py
    - extinction_lib.py

- Constructs spectra for objects in catalogue

- Goal: Have a library that can be called directly from the simulator codes (C++ or python). Avoid the bottleneck of writing/reading of intermediate spectrum files.

Status

- First version exists: EuclidSIM/trunk/euclidsim/TU_cxx

- Test script runs...

- **Completely untested**

- Needs to be validated against the python code

Minimal example of use inside a C++ code: (stellar catalogue)

```cpp
#include "sed_library.h"
#include "mw_extinction.h"

//Initialize the library
// Provide a SED catalogue file
  sed_library sedlib("EUC-TEST-SEDLIB-2013-11-14T152700.000.fits,1);

//Initialize a passband filter
  sedlib.attach_passband_file("EUC-TEST-FILSDSSR01-2015-02-02T203100.000.fits", 400.e-9, 700.e-9);
  sedlib.normalize_passband_to_Vega("Vega.sed");

//Set up an wavelength grid you want to work on
  vector<double> wgrid(21);
  double wmin=400.e-9, wmax=800.e-9;
  for (size_t i=0; i<wgrid.size(); i++)
    wgrid[i] = wmin+(wmax-wmin)*i/double(wgrid.size()-1);

//Initialize the MW extinction library
  mw_extinction mwext(wgrid, "odonnell");
```

```
//Loop over objects in catalogue
  for (int iobj=0; iobj<Nobj; iobj++)
   {
//Insert parameters from catalogue
     double magnitude = 12.55;
     double index_sed = 5643;
     double Av = 0.014;
     double Dist = 0.038;

//Select a SED template and normalize to desired magnitude
     sedlib.pick_sed(index_sed);
     sedlib.calibrate_to_magnitude(magnitude);

 //Extract the normalized spectrum to the working grid (wgrid)
     vector<double> spectrum=sedlib.return_interpolated_sed(wgrid);

//Apply MW extinction
     mwext.put_star_at_distance(spectrum, Dist);
     mwext.apply_mw_extinction(spectrum,Av);

// Vector "Spectrum" now holds the spectrum for your object. Use it wisely.

} //end of loop
```

Validation

- We need a python test script that does the same operations as the C++ test script

  - Compare the spectra

  - Note: Do not expect exactly the same results, because of small differences in implementation (different gridding etc.)

- SWIG interface still missing

- Help from python experts welcome