IVOA Interoperability Meeting

Theory: new developments
by

Summary

Theory Vobs.it developments:

- Stellar evolution track and isochrones data searchable by TOPCAT;
- VOTable for two services as prototypes of SimDAP:
  - Choosing quantities from different photometric system to add to an isochrone file;
  - Choosing and adding quantities to a track from a file (key point files) that has the abundance element info;
- New IRA-CINECA simulated cluster archive;
- Future plans;

BaSTI on TOPCAT

M. Molinaro implemented a series of Java classes to be inserted in TOPCAT application by M. Taylor, that permit direct queries to BaSTI database, the Teramo Astronomical Observatory database of a Bag of Stellar Tracks and Isochrones.
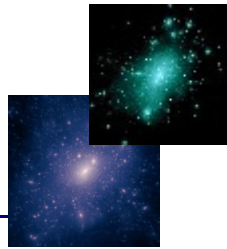
So a user can search inside the DB, choose the interest result and use directly all the potentiality of TOPCAT.

Demo

(Thanks to M. Taylor)

Different photo system inside one isochrone file

VOTable standard format for evolutionary model with four quantities mandatory: M, log(L), log(Te), log(t) and the

possibility of choosing a "colour" from different photometry models:

1. **ACS**: Advanced Camera for Survey - on board of HST - Vega mag (Bedin et al. 2005, MNRAS, 357, 1038);

2. **SLOAN**: Sloan system (Marconi et al. 2005, MNRAS, 371, 1503) ;

3. **JOHNSON CASTELLI**: Johnson-Cousins system (Pietrinferni et al. 2004, ApJ, 612, 168);

4. **STROEMGREN CASTELLI**: Stroemgren system (Pietrinferni et al. 2006, ApJ, 642, 797) ;

5. **WALRAVEN** : Walraven system;

6. **WFC2 HST**: Wide Field Planetary Camera 2 system - on board of HST ;

7. **WFC3 (UVIS) HST**: Wide Field Camera 3 (UVIS) system - on board of HST ;

VOTable format for photometric quantities service [link](#)

More quantities on a Track file: abundances and others

To a track file will be possible to add one of these quantities

- Log_t   Logarithm of age (yr)
- H_HE   H or He central abundance
- Log_L   Logarithm of Luminosity (in solar units)
- Log_Te   Logarithm of effective Temperature (K)
- Log_Tc   Logarithm of central Temperature (K)
- Log_Rc   Logarithm of central Density (cgs units)
- Mcc   Mass of convective core (solar units)
- M_cHe   Mass of He core (solar units)
- M_cCo   Mass of C-O core (solar units)
- Mce   Mass of convective envelope (solar units)
- Lpp_Ls   p-p chain Luminosity (in units of Surface Luminosity)
- Lcno_Ls   CNO chain Luminosity (in units of Ssurface Luminosity)
- L3a_Ls   3-alpha chain Luminosity (in units of Surface Luminosity)
- Lgr_Ls   Gravitational Luminosity (in units of Surface Luminosity)
- He_sup   Surface He abundance
- Mtot   Total star mass (in solar units)
- Log_Tmax   Logarithm of maximum Temperature off-center

VOTable format for key point phase quantities service

[link](#)

C:\Users\Manzato\Documents\ITVO\Presentazioni\2010_Victoria\kpt_track\Track_KPTservice.xml - Windows Internet Explorer

C:\Users\Manzato\Documents\ITVO\Presentazioni\2010_Victoria\kpt_track\Track_KP`

Google

Preferiti   C:\Users\Manzato\Documents\ITVO\Presentazio...

C:\Users\Manzato\Documents\ITVO\Presentazioni\2010_Victoria\kpt_track\Track_KPTservice.xml

```xml
<?xml version="1.0" encoding="UTF-8" ?>
- <VOTABLE version="1.2" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns="http://www.ivoa.net/xml/VOTable/v1.2" xmlns:stc="http://www.ivoa.net/xml/STC/v1.30">
    <DESCRIPTION>Isochrone photometry system by Pietrinferni - Cassisi - Salaris - Castelli 2006 ::: Standard Model -
      Scaled solar model & transformations (Castelli 1999) + BaSeL Library (2002) + Empirical Transf. for C-
      Stars</DESCRIPTION>
  - <RESOURCE>
      <DESCRIPTION>This file is aimed at let the user get and use one or more quaantities contained in the key points
        files for one track. The fields log(age), M/Mo, log(L/Lo) and logTe are fixed and than the use can choose one
        or more photometric magnitude</DESCRIPTION>
      <DESCRIPTION>For further information on PARAM(s) and FIELD(s) see:
        "http://wwwas.oats.inaf.it/IA2/index.php?option=com_wrapper&Itemid=87"</DESCRIPTION>
    - <PARAM arraysize="*" datatype="char" name="DataType" ucd="meta.note" unit="--" value="Stellar Track">
        <DESCRIPTION>Type of data simulation for this service</DESCRIPTION>
      </PARAM>
    - <PARAM arraysize="*" datatype="char" name="KPT quantities" ucd="meta.note" unit="--">
        <DESCRIPTION>Quantities avalilable inside the key point file</DESCRIPTION>
      - <VALUES>
          <OPTION name="H/HE" value="H/HE">H/HE</OPTION>
          <DESCRIPTION>H or He central abundance</DESCRIPTION>
          <OPTION name="logTc" value="logTc">logTc</OPTION>
          <DESCRIPTION>Logarithm of central Temperature (K)</DESCRIPTION>
          <OPTION name="logRc" value="logRc">logRc</OPTION>
          <DESCRIPTION>Logarithm of central Density (cgs units)</DESCRIPTION>
          <OPTION name="Mcc" value="Mcc">Mcc</OPTION>
          <DESCRIPTION>Mass of convective core (solar units)</DESCRIPTION>
          <OPTION name="M_cHe" value="M_cHe">M_cHe</OPTION>
          <DESCRIPTION>Mass of He core (solar units)</DESCRIPTION>
          <OPTION name="M_cCO" value="M_cCO">M_cCO</OPTION>
          <DESCRIPTION>Mass of C-O core (solar units)</DESCRIPTION>
          <OPTION name="Mce" value="Mce">Mce</OPTION>
          <DESCRIPTION>Mass of convective envelope (solar units)</DESCRIPTION>
          <OPTION name="Lpp/Ls" value="Lpp/Ls">Lpp/Ls</OPTION>
          <DESCRIPTION>p-p chain Luminosity (in units of Surface Luminosity)</DESCRIPTION>
          <OPTION name="Lcno/Ls" value="Lcno/Ls">Lcno/Ls</OPTION>
          <DESCRIPTION>CNO chain Luminosity (in units of Ssurface Luminosity)</DESCRIPTION>
          <OPTION name="L3a/Ls" value="L3a/Ls">L3a/Ls</OPTION>
          <DESCRIPTION>3-alpha chain Luminosity (in units of Surface Luminosity)</DESCRIPTION>
          <OPTION name="Lgr/Ls" value="Lgr/Ls">Lgr/Ls</OPTION>
          <DESCRIPTION>Gravitational Luminosity (in units of Surface Luminosity)</DESCRIPTION>
          <OPTION name="He_sup" value="He_sup">He_sup</OPTION>
          <DESCRIPTION>Surface He abundance</DESCRIPTION>
          <OPTION name="log(Tmax)" value="log(Tmax)">log(Tmax)</OPTION>
          <DESCRIPTION>Logarithm of maximum Temperature off-center</DESCRIPTION>
        </VALUES>
      </PARAM>
    - <TABLE ID="data1" name="Colour Data" utype="">
        <DESCRIPTION>Output Data fix and asked key points quantities</DESCRIPTION>
      - <FIELD arraysize="*" datatype="char" name="Column name" ucd="" unit="--">
          <DESCRIPTION>Column Name of the file</DESCRIPTION>
        </FIELD>
        <FIELD arraysize="*" datatype="char" name="Description column" ucd="" unit="--">
```

EURO VO

Cineca Data Archive

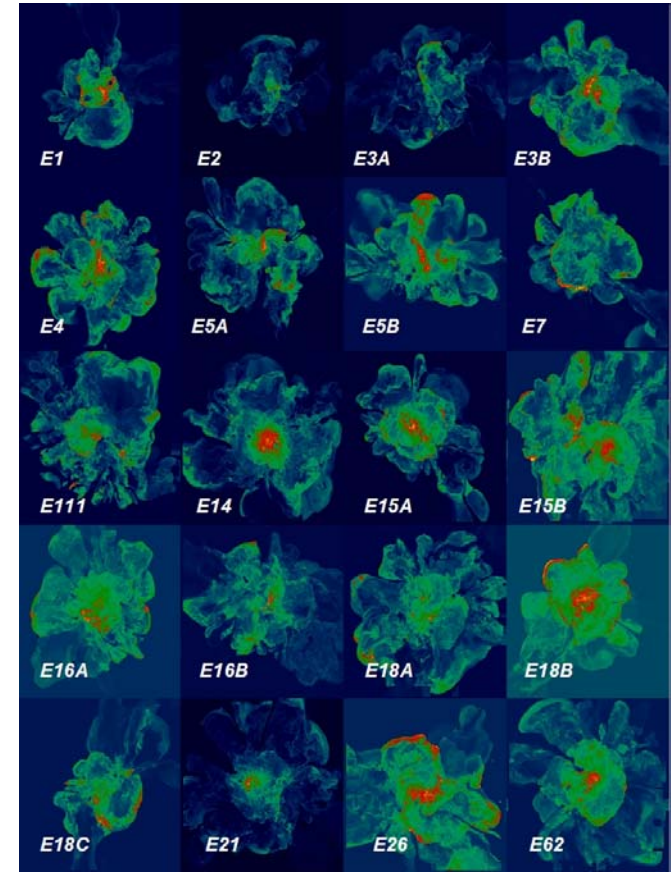## http://data.cineca.it/

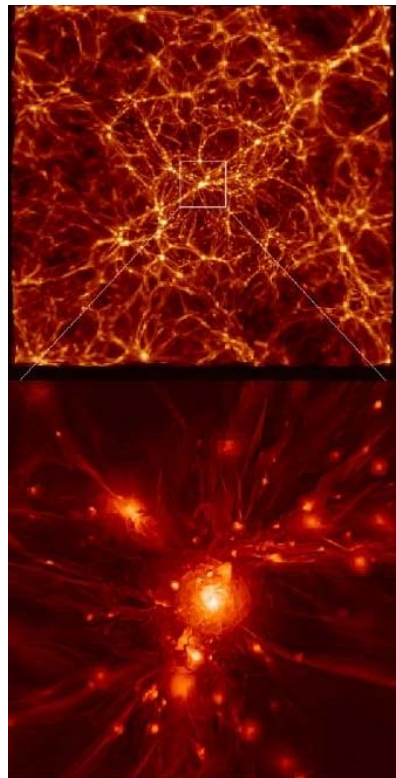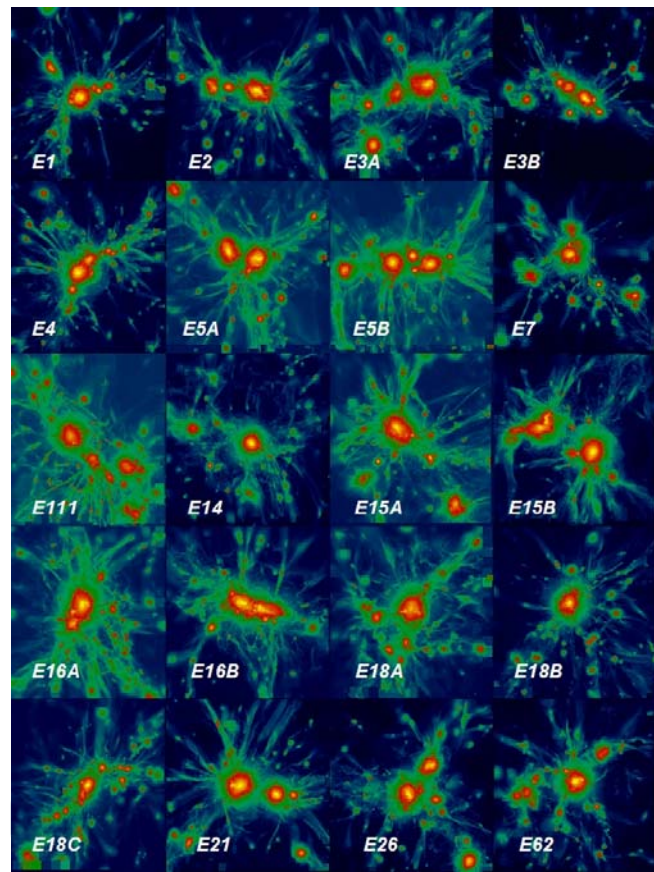## The IRA-CINECA Simulated Clusters Archive
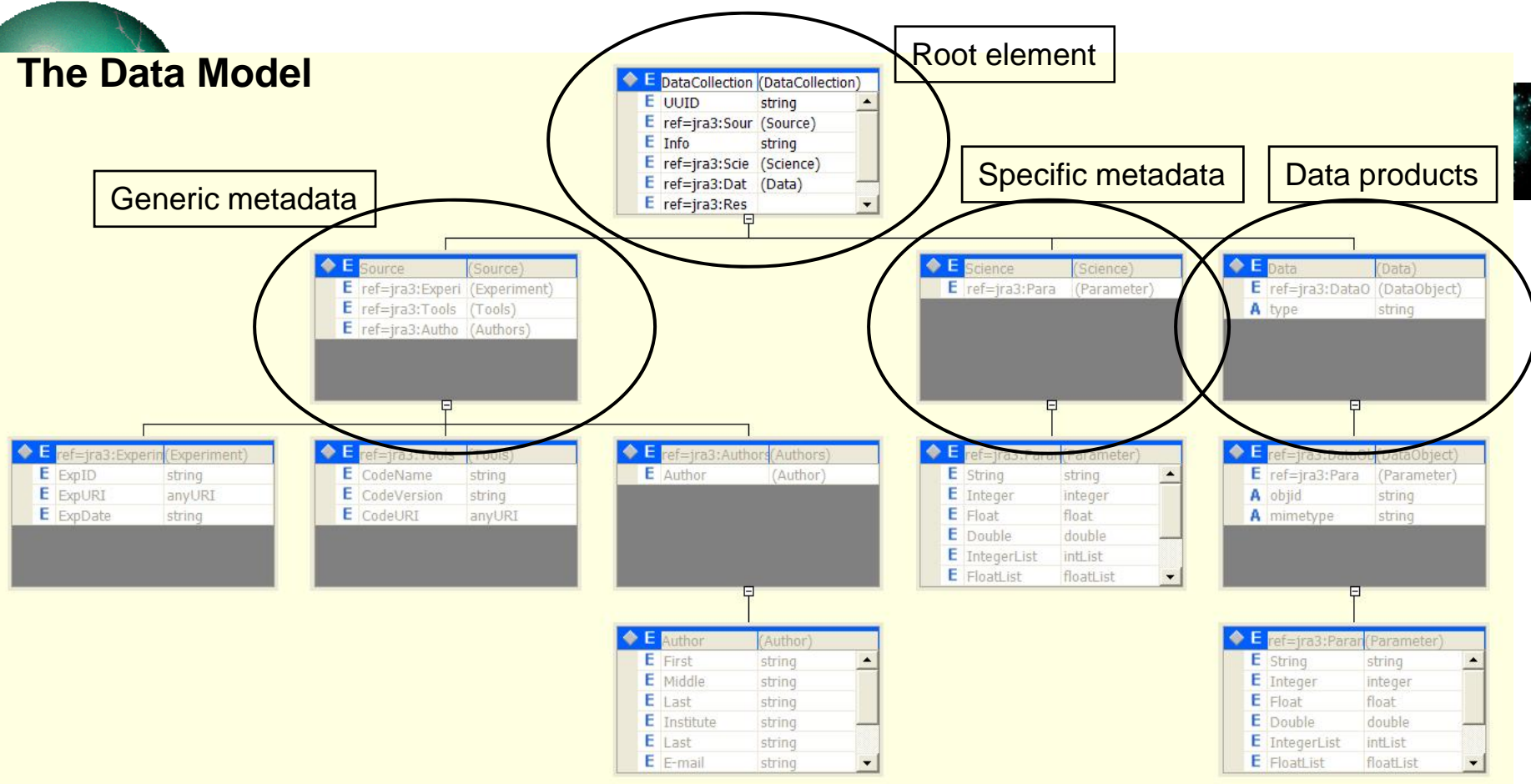
The IRA-CINECA Simulated Clusters Archive

The archive collects the data of a sample of 20 galaxy clusters with large masses, simulated with high spatial resolution using the ENZO 1.5 Cosmological AMR code.

Authors: Franco Vazza (PI) and Gianfranco Brunetti (IRA-INAF), Claudio Gheller and Riccardo Brunino (CINECA)
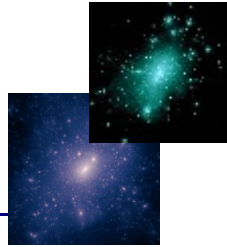
http://data.cineca.it

The Data Model

The model is designed to describe each single simulation in terms of:
- Generic searchable metadata (general infos of the whole run – author, code…)
- Specific searchable metadata (specific infos on science – cosmological model…)
- Data products (snapshots, Level 1 post-processed data)

XML schema available at http://www.hpc-europa.eu/files/schemavs2.5.xsd

Implementation and services

The data is stored on a dedicated SP6
(CINECA supercomputer, http://www.cineca.it/bdp/r/sezioni/risorse_it/hardware/index)
filesystem (GPFS technology)
The archive is implemented using iRODS (https://www.irods.org/)

Services:
At present we have only the web page (with lots of infos)……. But…….

We expect to provide:
• Query capabilities (seach for interesting data querying matadata)
• Data preview (using a light visualization service)
• Data download

"Real" data are large binary files in HDF5 (http://www.hdfgroup.org/HDF5/)
format. An associated VOTable, describing the data and the content of
the file is delivered to the user… see example…

CINECA archive VOTable Example

link

Future plans

- New data inside BaSTI DB:
  white dwarf models;

- New DB for BaSTI synthetic spectra and make these visible by VOSpec via SSAP;

- Investigate interoperability between single galaxy simulation and stellar model? (could the ouput parameter of stellar model be the input of a galaxy simulation?)

Acknowledgement

Thanks to all the theory Vobs.it group

P. Manzato	S. Cassisi	*F. Vazza*	R. Brunino
M. Molinaro	A. Pietrinferni	*G. Brunetti*	C. Gheller
F. Pasian			