

iDataLib: irenic Data Library Project



CNAF, LNGS



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Evaluated data libraries

- Tabulations of physics quantities: cross sections, nuclear and atomic parameters, secondary particle spectra...
- Derive from the evaluation of the body of knowledge of theoretical computations, experimental measurements or both
- Essential tool for Monte Carlo particle transport, experimental physics and engineering applications
- Some of the most popular are:
 - BROND (Russian Evaluated Neutron Data Library): Russia
 - CENDL (Chinese Evaluated Nuclear Data Library): China
 - ENDF (Evaluated Nuclear Data File): USA
 - JEFF (Joint Evaluated Fission and Fusion File): France
 - JENDL (Japanese Evaluated Nuclear Data Library): Japan – TENDL (Talys): PSI
- Proprietary and personal compilations (usually of specialized scope)

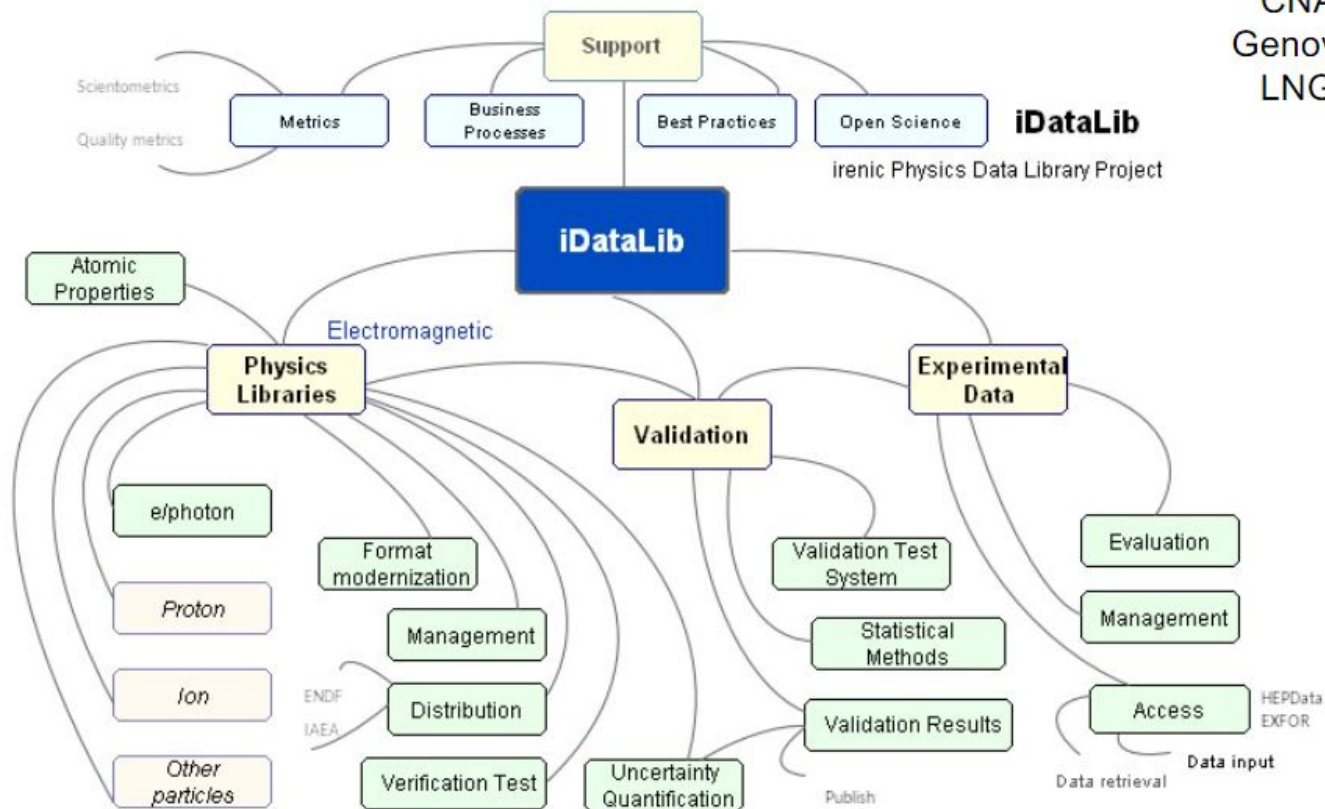
Continuazione di quello che facciamo da > 20 anni
nella fisica di sistemi di trasporto

iDataLib

Approvazione CSN5 2020

Inizio 1/1/2021

CNAF
Genova
LNGS



Temi di Lavoro

Tests di validazione:

Sezioni d'urto di interazioni
elettromagnetiche

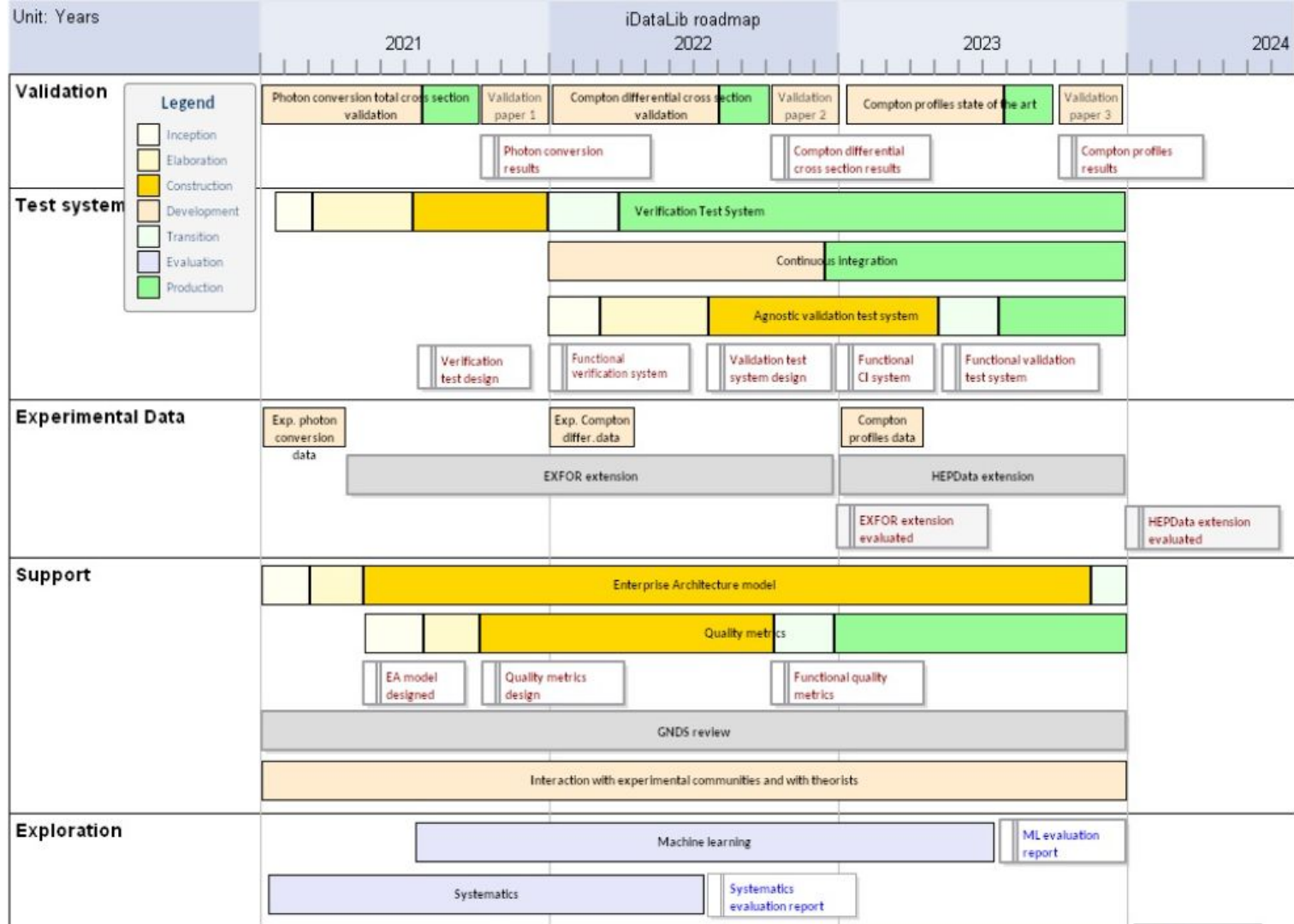
Transizioni atomiche

Parametri atomici

Osservabili macroscopiche (energia
depositata, backscattering, etc)

Sviluppo di strumenti:

Generalizzazione e automazione di
strumenti di test, che hanno raggiunto
adeguato livello di maturita'



Milestones

Processo iterativo-incrementale

2021

Milestone 1 - 30/04/2021 (Enterprise architecture) Fatto sezione di genova

Milestone 2 - 30/06/2021 (Design di verification test) Fatto sezione di genova e CNAF

Milestone 3 - 31/08/2021 (Validazione sezione d'urto di fotoni) sezione di genova, LNGS

Milestone 4 - 30/09/2021 (Design di metriche di qualita') sezione di genova e CNAF

Milestone 5 - 31/12/2021 (Implementazione di verification test) sezione di genova e CNAF

Verification test: requirements

Verification tests

- ✓ + RQ083VER Verify library content
- ✓ + RQ084VER Assess consistency
- ✓ + RQ085VER Assess differences

Test targets

- ✓ + RQ068VER Identify target data libraries
- ✓ + RQ069VER EADL is a target
- ✓ + RQ070VER EEDL is a target
- ✓ + RQ071VER EPDL is a target
- ✓ + RQ072VER ENDF-6 is a test format
- ✓ + RQ073VER ENDL is a test format
- ✓ + RQ074VER GND5 is a test format
- ✓ + RQ075VER ENDF development repository is a source
- ✓ + RQ076VER ENDF/B is a distribution source
- ✓ + RQ077VER EXDL is a target
- ✓ + RQ078VER Public ENDF/B release is a source
- ✓ + RQ079VER IAEA EPICS is a distribution source
- ✓ + RQ080VER NNDIC is a distribution source
- ✓ + RQ081VER Identify target data formats
- ✓ + RQ082VER Identify target data sources

Test build

- ✓ + RQ058VER Build tests
- ✓ + RQ059VER Supported compilers are defined
- ✓ + RQ060VER Supported operating systems are defined
- ✓ + RQ061VER Supported platforms are defined
- ✓ + RQ062VER The test system has build scripts
- ✓ + RQ063VER Each package must have build scripts

Test execution

- ✓ + RQ064VER Execute tests
- ✓ + RQ065VER Report test results
- ✓ + RQ066VER Identify acceptable test results
- ✓ + RQ067VER Identify critical test results

Manage units

- ✓ + RQ043VER Define pertinent units
- ✓ + RQ044VER Identify pertinent unit for data type
- ✓ + RQ045VER Identify units for data library format
- ✓ + RQ046VER Identify units for data library version
- ✓ + RQ047VER Associate data with defined units
- ✓ + RQ048VER Comply with Geant4 (CLHEP) System of Units

Manage data content

- ✓ + RQ025VER Assess if a data type is present in a library
- ✓ + RQ026VER Define baseline data types
- ✓ + RQ027VER Define baseline data types in ENDF format
- ✓ + RQ028VER Define baseline data types in ENDL format
- ✓ + RQ029VER Identify common data sets across formats
- ✓ + RQ030VER Identify data range
- ✓ + RQ031VER Identify data types across data formats
- ✓ + RQ032VER Identify data types present in a library
- ✓ + RQ033VER Identify dependent variable range
- ✓ + RQ034VER Identify independent variable range
- ✓ + RQ035VER Identify specific data sets for each format
- ✓ + RQ036VER Select data format
- ✓ + RQ037VER Select data library
- ✓ + RQ038VER Select data set
- ✓ + RQ039VER Select data source
- ✓ + RQ040VER Select data subset for a subshell
- ✓ + RQ041VER Select data subset for an element
- ✓ + RQ042VER Select data type

Reformat data

- ✓ + RQ055VER Reformat data libraries
- ✓ + RQ056VER Reformat to la Geant4
- ✓ + RQ057VER Reformat into GND5

Intrinsic consistency

- ✓ + RQ010VER Assess intrinsic consistency
- ✓ + RQ011VER The expected data library is present in a distribution source
- ✓ + RQ012VER Define expected data types for a library
- ✓ + RQ013VER The expected data types are present
- ✓ + RQ014VER Define baseline data in GND5 format
- ✓ + RQ015VER Data are present in the expected format
- ✓ + RQ016VER Define expected Z range
- ✓ + RQ017VER Data are present for the expected range of elements
- ✓ + RQ018VER Data cover the expected range
- ✓ + RQ019VER Cross sections are tabulated in the expected energy range
- ✓ + RQ020VER Define pertinent subshells for a given element
- ✓ + RQ021VER Data for the expected subshells are present
- ✓ + RQ022VER Data are interpolable
- ✓ + RQ023VER Identify data with monotonic independent variable
- ✓ + RQ024VER Verify if independent variable is strictly monotone

Physics consistency

- ✓ + RQ049VER Assess physics consistency
- ✓ + RQ050VER Cross sections must be greater than zero
- ✓ + RQ051VER Subshell data are present where appropriate
- ✓ + RQ052VER Verify consistency of binding energies with absorption edges
- ✓ + RQ053VER Verify consistency of binding energies with transition energies
- ✓ + RQ054VER Verify if data are consistent with published original tabulations

Compare libraries

- ✓ + RQ001VER Compare data across different formats
- ✓ + RQ002VER Compare data across distribution sources
- ✓ + RQ003VER Assess data evolution across different versions

Comparison

- ✓ + RQ004VER Compare data
- ✓ + RQ005VER Select baseline
- ✓ + RQ006VER Select comparison target
- ✓ + RQ007VER Define comparison criterion
- ✓ + RQ008VER Produce comparison outcome
- ✓ + RQ009VER Define acceptable outcome

Preliminary

Partecipanti e Finanze

C. Duma 7%, E. Ronchieri 10%

Richieste finanziarie “ordinarie”: in linea con le finanze del 2021

Risorse umane: tirocinanti