Programme for Research-Development-Innovation on
Space Technology and Advanced Research - STAR

Software development and integration for access to large-scale atomic databases and analysis applications DATOM

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- Coordinating organization
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- Project manager
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- Short description of the project

support for physics related x-ray astrophysical observations providing large scale relativistic atomic data for the Fe-peak elements (Co, Ni, Fe) and for the light elements such as C, N, O or Ar;

model the plasma emission spectra under extreme conditions

support for the hardware infrastructure, the framework and its associated tools (code platform)

the data communication system (UALor Universal Access Layer)

the Web portal and several applications (integrated modeling tools) and the data management (data structure and handling).

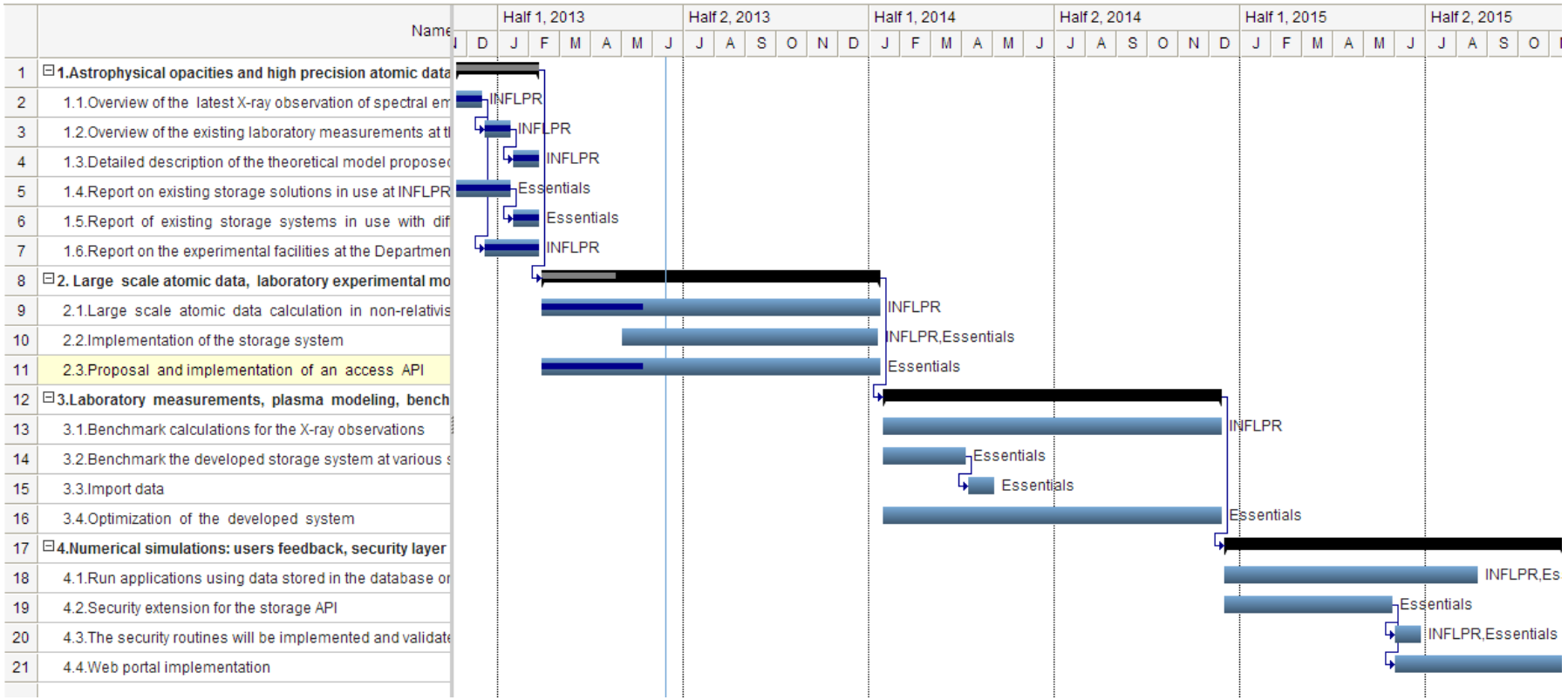
- Project goal
  - Objective 1: Large-scale atomic data calculation and related spectral modelling;
  - Objective 2: Advanced graph database for data representation and data processing;
  - Objective 3: Web Portal.

- Objectives
  - 1. Theoretical computations;
  - 2. Laboratory measurements and plasma modeling;
  - 3. Numerical simulations and databases;
  - 4. Advanced graph database for data representation and data processing;
  - 5. Web Portal.
- Estimated results
  - The project uses the R-matrix method in atomic physics and provides new model calculation where the importance of including configuration interaction wave functions both in the target-state expansion and in the (N + 1)-electron quadratically integrable function expansion is discussed (V Stancalie: Forbidden transitions in excitation by electron impact in Fe-peak element CoIV ion", Physica Scripta 2011). With this respect, the aim of the project is high precision first, then completeness supporting benchmark state-of-art theoretical calculations with experiments for: Photoionization – Accelerator based Advanced Light Sources (Reno/Berkeley, Aarhus, Paris); Recombination – Heavy ion storage rings (Heidelberg, Stockholm); Electron-Ion Scattering – Electron Beam Ion Traps (Livermore, NIST).
  - The proposed graph system aims at improving both data access and data storage. It is a new kind of data representation that allows for parallel computing due to multiple storage servers employed combined with data storage in binary files.

- Human resources involved
  - Specialized human resourcesas well as young scientistsare involved in numerical simulation
  - two project managers (from CO and P1)
  - scientific researchers
  - software analysts
  - programmers

- Start date of the project / End date of the project
  - 01.12.2012 – 01.12.2015

- Work plan of the project



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- Implementation status of the project
  - Existing storage systems were analyzed in order to identify the needs related to storing large amounts of data
  - Requirements for running distributed applications with regard to the storage sub system were formulated
  - Work has begun on the new Graph Database storage
  - Proposals were formulated for the underlying mechanisms and for the access API

(max. 1 slides)

- Risk analysis and contingency plan (lessons learned)

(max. 1 slide)

- Project's contribution to the goal of the STAR Programme
  - By producing a system able to deal with large amounts of data, such as those produced by ESA missions, organizations using this new storage and classification system have an advantage for actively participating in the analysis of ESA related data

(how the project contributes to the increasing of the capacity for organizations involved to participate in ESA programmes)

- Dissemination activities
  - It is planned to publish papers regarding the new storage system
  - A web portal is planned for a later stage of the project

- Conclusions