A short description of AMNS

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Design Goals for AMNS

- From the ITM era:
  - AMNS data should be centralized and managed
    - Version control of data imported to the ITM-TF data base is mandatory.
    - The provenance of the data must be accurate and stored in the ITM database
    - For “production” runs with ITM-TF codes using AMNS data it is important that the data have been given a stamp of approval by an expert.

Design Goals for AMNS

- The data should be comprehensive, ubiquitous and easily used
  - This means identifying what data is needed
    - not always easy!
  - The AMNS data must be communicated to ITM-TF codes via a standardised interface
    - this should also ensure coherence between different ITM-TF codes needing the same type of data
  - All AMNS data used by codes should be available through the AMNS data interface
    - no back doors

Design Goals for AMNS access

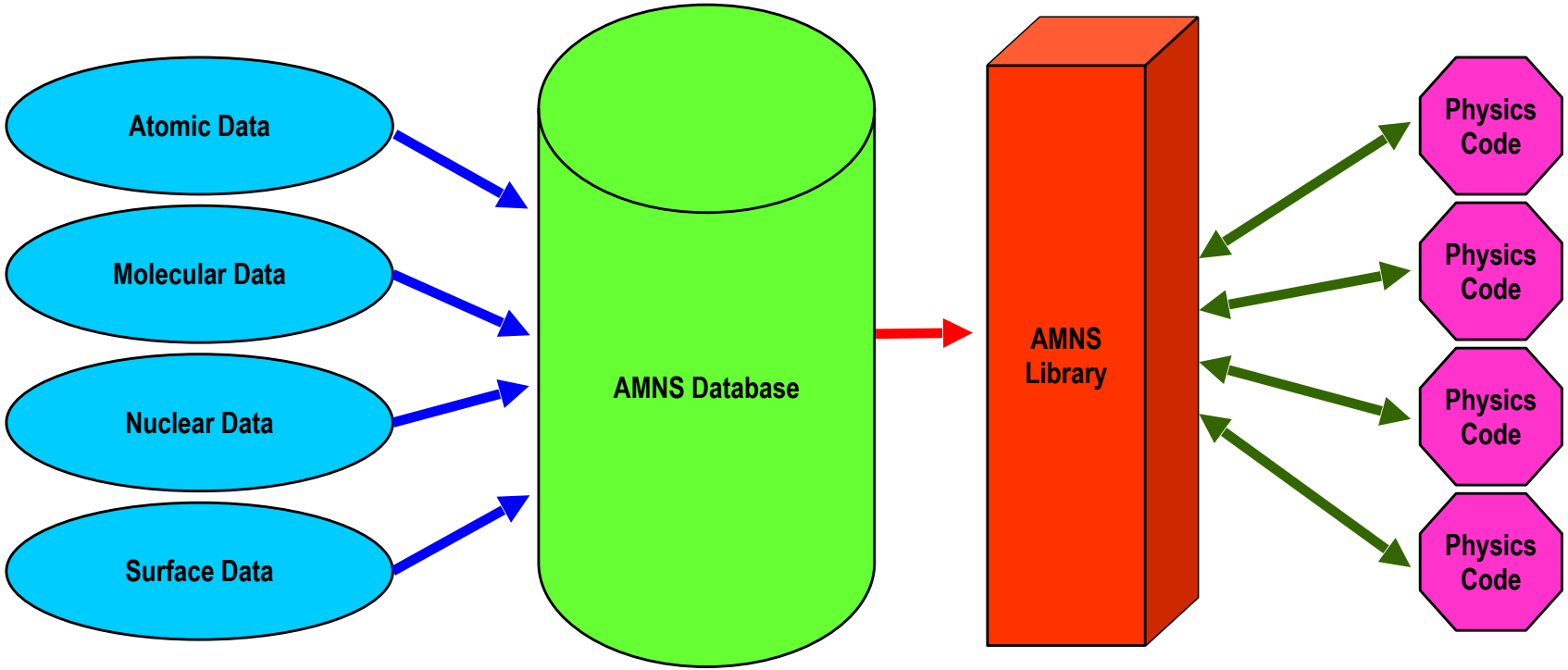
Physics code

- Access to AMNS data only via interface
  - initialization (2)
  - finalization (2)
  - querying parameters (2)
  - setting parameters (2)
  - **getting data** (1)
- Separation between use of the data and the implementation of the data
- Code author doesn't need to become an expert in AMNS
- Ensures compatibility between codes

AMNS implementation

- Only accessed by a set of defined calls
- Implementation by AMNS experts
- Different versions can be supported
- Different implementations possible
  - Analytic formulae
  - Table lookup
- "Old" versions should always be recoverable (even if wrong)
- Should become easier to implement "new" data

Design Goals for AMNS

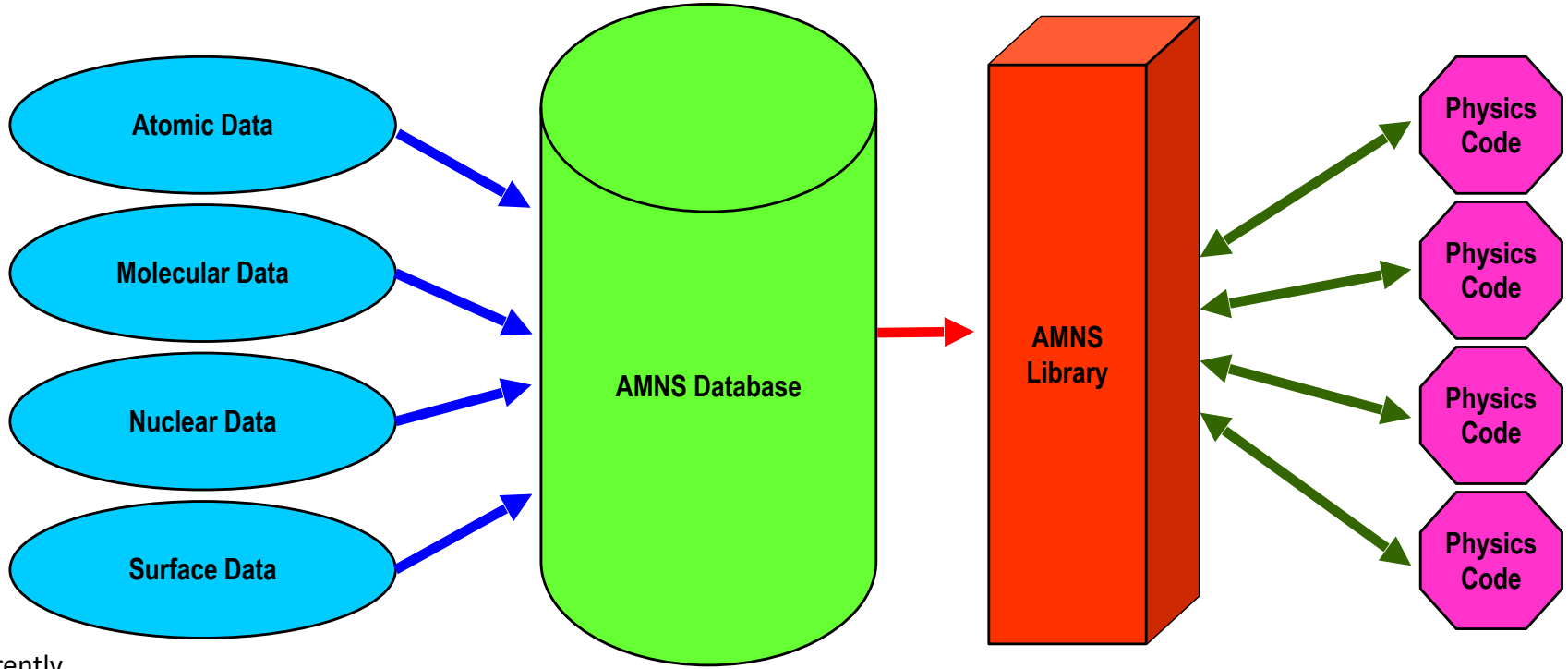


- Data selection
- Data import

- Data storage
- Data transport

- User interface design
- Supporting multiple languages

Design Goals for AMNS



Currently

- ADAS ADF11
- Nuclear cross section and rates

Previous (CPO) version also included

- Surface reflection and sputtering data
- Elastic collisions

- Initially used CPOs
- Now using IDSs

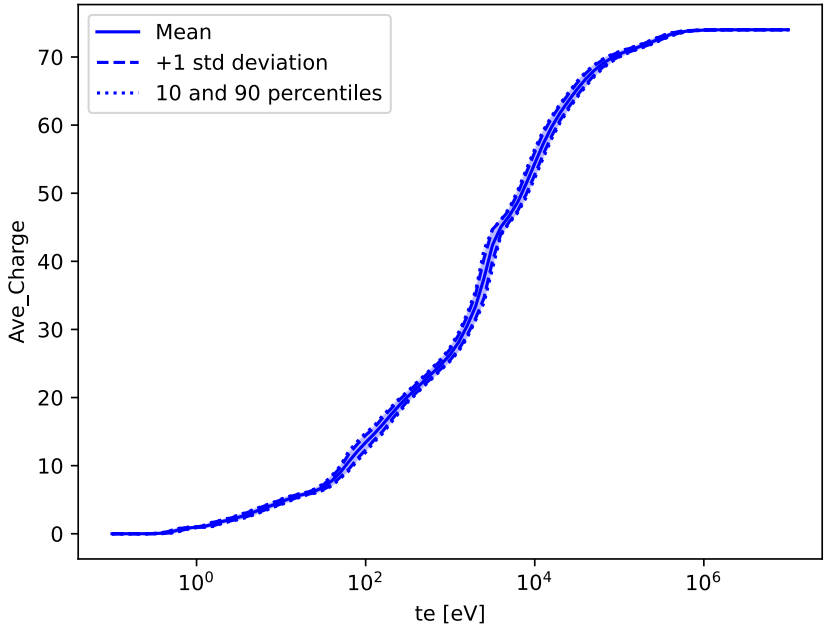
- Library written in Fortran
- Interfaces to Fortran, Python, C, MATLAB, Java

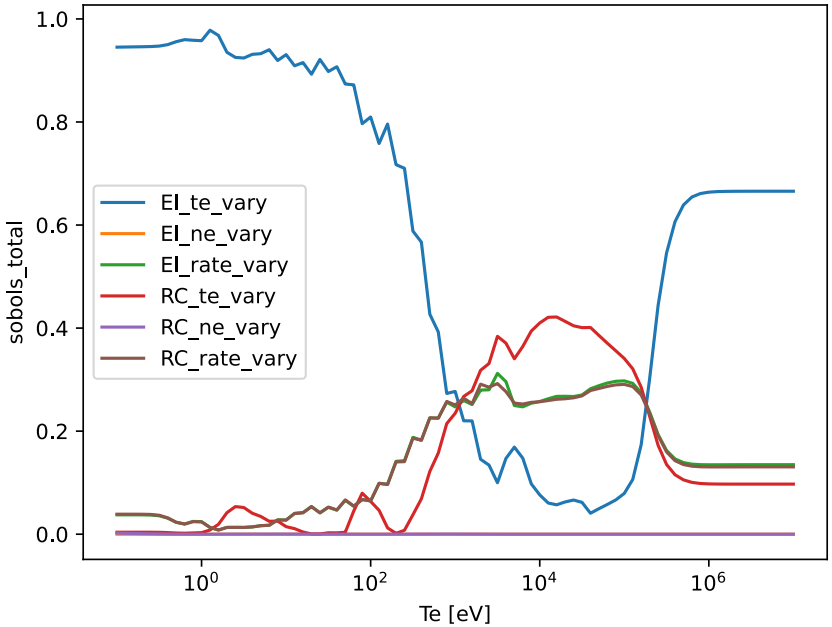
Some areas where more work is needed

- The fact that the IDSs (data dictionary and access layer) are still closed source limits the appeal outside the ITER community
  - Would like to see DD, AL and AMNS open sourced
    - And easier to install
  - Could also imagine an implementation not using IDS's for the backend
- Data ingestion is done by a driver written in Fortran (historical reasons)
  - Might make more sense to have this in Python (good ADAS bindings plus easier access to other formats for data input)
- Data storage is still in locally stored IDS's
  - Having a global IDS infrastructure would be useful
    - UDA?
    - CernVM-FS?
- Should have a push in the community to bring in more data (ADF15, beam stopping, more nuclear data, reintroduction of surface data, molecular data)
  - Then have a push in the code community to use the data

Application to UQ for W rates

- Average charge and total Sobols: EI_te_vary dominant over most of the range except for an important Te range where RC_te_vary takes over …





Usage of N data from AMNS

- Use AMNS nuclear rates to look at the density of various components as a function of temperature at 1000 seconds starting with 5×10^{19} m^{-3} each of D and T