

# Use of ADAS in SOLPS

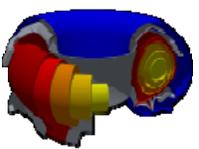
- SOLPS is the combination of
  - Eirene: kinetic (Monte-Carlo) neutrals code
    - Uses own atomic physics package
  - B2: fluid plasma code (+ fluid neutral model)
    - Uses STRAHL, ADPAK or **ADAS**
- Topics
  - Bundled charge state model
  - Electron cooling rates
  - CX for more than just C

# Bundled charge states

- Want to be able to model W
- Want to be able to speed up Ar/Kr calculations
  - Bundled charge state
    - Need
      - $Z(n_e, T_e)$
      - $Z^2(n_e, T_e)$
      - $E_{\text{pot}}(n_e, T_e)$
      - Electron cooling rate
    - On SOLPS side will need to
      - Make  $Z$ ,  $Z^2$  and  $E_{\text{pot}}$  functions of  $n_e$  and  $T_e$

# Bundled charge states, II

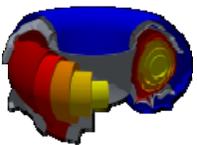
- Would like to have, or be able to generate, tables with varying amounts of bundling
  - For example, for W
    - 6 bundles (same cost to run as C)
    - 10 bundles (same cost as Ne)
    - 18 bundles (same cost as Ar)
- Also would like to be able to predict lines arising from the bundles to match against experiment



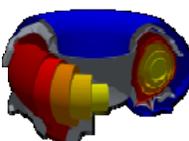
# Electron cooling rate

- ADAS provides
  - Radiation rate
  - Ionization rate
- In addition
  - Formula for bremsstrahlung
  - Tables for ionization potential
- Need electron cooling rate
- Current solution
  - Combine the above to generate the electron cooling rate
  - Would like to have an ADAS table that does better!

# CX rates



- Currently only ADAS data for C and T (not H or D) seems to exist
- SOLPS (B2) had been using a fit that Braams created for CX values for which no data was available
  - This turned out to be wildly wrong for C under some conditions
  - Typically now use
    - ADAS for C
    - Braams' fit for H/D/T
    - 0 for all other species
  - Would like to do better!



# Time-scales for using updates

- New CX data
  - Could be used immediately
- New electron cooling rate tables (or better prescription for deriving it)
  - < 1 day to implement
- Bundled charge state model
  - Some coding necessary: < 1 month