Charge exchange and beam emission spectroscopy Callable ADAS Exercises

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1 Aim

Presumably you know the aims by now. Harder questions are marked with 🎃s today.

2 Tasks

1. Use `read_adf12` to read effective charge exchange emission coefficients for the $n = 8 \rightarrow n = 7$ transition of CVI.
   - Write a program which can turn a fitted line area into a carbon concentration given a known beam energy, beam density and plasma parameters🎃🎃🎃.
2. Use `read_adf22` to read beam populations (`BMP`) for a hydrogen beam, look at the relative populations of $n = 2$ to $n = 1$ as a function of energy.
   - Combine these populations with two ADF12 files (via `read_adf12`) and explore the variation with energy, compare it with just assuming $n = 1$ population🎃🎃.
3. Use `read_adf21` to read beam stopping coefficients for a plasma with 1% carbon content.
   - Integrate a real beam over a sensible profile, find the penetration depth as a function of carbon concentration🎃🎃🎃🎃🎃.
4. Use the AFG (ADAS Feature Generation) system to produce a beam emission feature (`res=afg(/help)`).
   - Have AFG return information about the various parameters to you and print them to screen🎃.
5. Use `run_adas310` to produce beam stopping coefficients.
   - Combine this with `read_adf21` to produce a plot of beam stopping as a function of beam energy without using a central ADAS ADF21 file🎃🎃.
6. Use `read_adf22` to read beam emission (`BME`) coefficients.
   - Integrate this into your (🎃🎃🎃🎃🎃) beam attenuation code to predict absolute beam emission as a function of radius🎃🎃🎃🎃.