

CRETIN

- 1-, 2-, and 3-dimensional non-LTE atomic kinetics / radiation transfer code
- Arbitrary mixtures of elements
- All physics data derived from collisional-radiative models
- Generates screened-hydrogenic atomic models or uses externally-supplied atomic data
- Originally written as an astrophysics research tool to model accretion disks – “cretin” is a contraction of “accretion”

Computer lab - CRETIN

- Execute: “source /home/nfs3/smr3105/hscott/addcr”
- Materials are in \$CRDIR
 - \$CRDIR/bin/cretin ← will be in your path
 - \$CRDIR/Doc/... ← documentation
 - \$CRDIR/Exercises/... ← exercise files
 - \$CRDIR/Examples/... ← files used for lecture examples
 - \$CRDIR/Tests/... ← regression tests
 - \$CRDIR/Models/... ← atomic models (Z = 1-42)
- Copy documentation and exercises to your space
 - “mkdir ~/Cretin”
 - “cp -a \$CRDIR/Doc \$CRDIR/Exercises ~/Cretin”

Extras

- Execute: “source /home/nfs3/smr3105/hscott/addcr2”
- Sets default behaviors for ULTRA with ~/.ultrarc
- Defines function for setting number of threads
e.g. “threads 8”

Simulation setup

1. Atomic model(s)
 - constructed from energy level + transition rate data
2. Physics options
 - LTE/NLTE, radiation transport + frequency mesh, ...
 - time-dependent or steady-state
3. Spatial mesh (w/ material distribution)
4. Initial conditions
5. Desired output quantities

This information is contained in a generator file – ex2.gen

Output quantities are produced in output files – ex2.plt, ex2.ult
ex2.plt is text and can be used with many plotting packages
ex2.ult is binary and can be viewed with ULTRA

Radiation Transport “flavors”

Continuum, lines and spectra are treated separately for efficiency

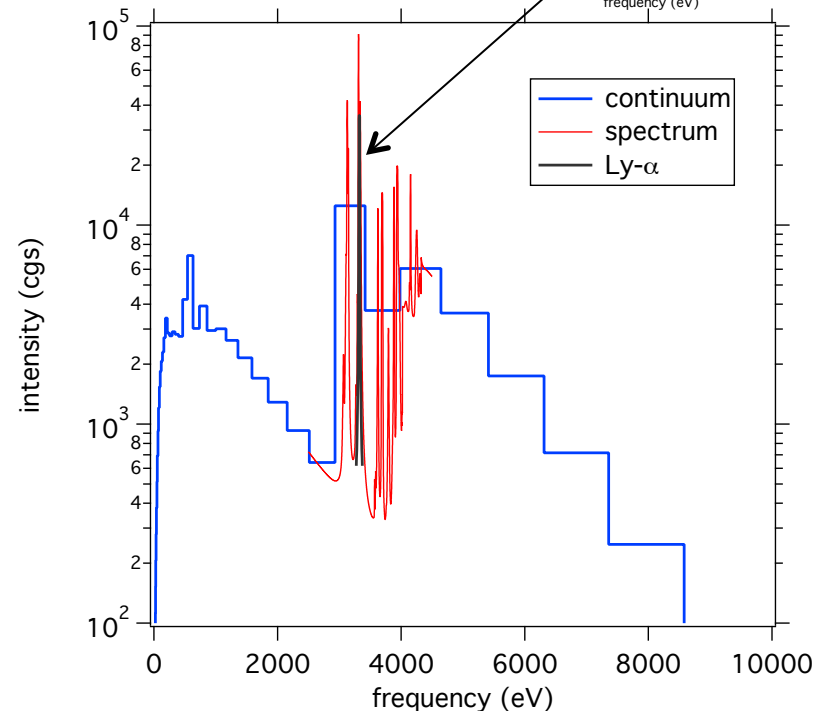
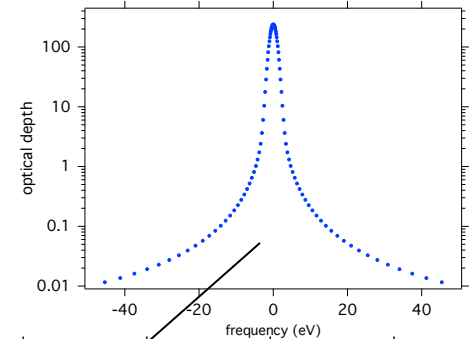
Iterated to consistency with atomic kinetics (and other processes):

- coarsely-binned continuum radiation over full energy range for evaluating photo rates
- finely-binned line radiation for resolving individual line profiles

Evaluated after convergence:

- spectral radiation on fine bins to resolve features in energy range(s) of interest

1 keV DT sphere
seeded with Ar



CRETIN is export controlled
- documentation also

Restrictions –

1. You may use the code, but do not copy it
2. You may have a copy of the User Notes, but do not give them to others

The code is available, but only with a collaboration agreement – contact me at hascott@llnl.gov

CRETIN User Notes

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Export Controlled Information

Contains technical data whose export is restricted by statute. Violations may result in administrative, civil, or criminal penalties. Limit dissemination to authorized U.S. Department of Energy and major U.S. DOE contractor personnel. The cognizant program manager must approve other dissemination, in accordance with applicable regulations. This notice shall not be separated from the attached document.

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