

New data and plans for the next year at Auburn

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Atomic data from the last year

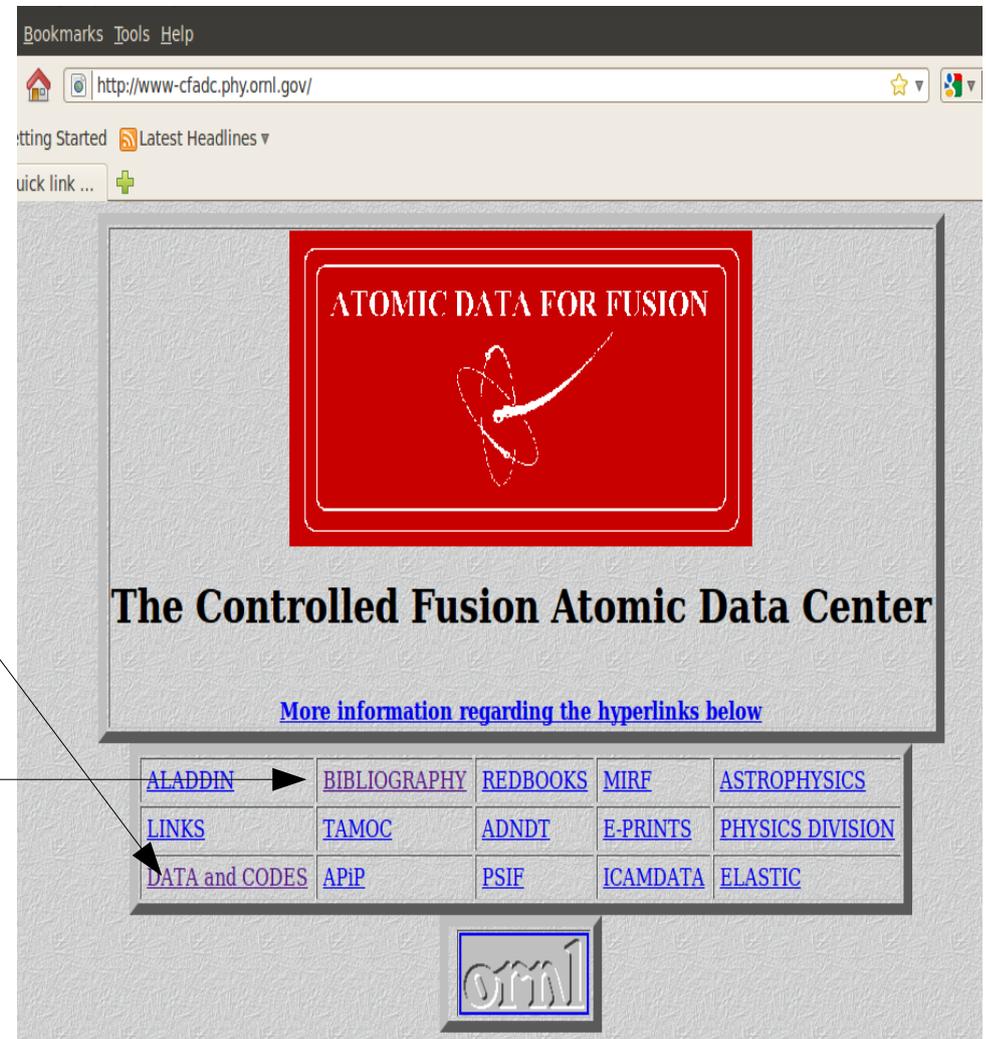
- Electron-impact excitation using R-matrix codes
 - Fe²⁺ {Dirac RM}
 - [Bautista et al., *ApJ Letts* **718** L189 (2010)]
 - Ne²⁺ {BP-RM}
 - [McLaughlin et al, *JPB* **17** 175206 (2011)]
 - Ne³⁺ and Ne⁶⁺ {ICFT-RM}
 - [Ludlow et al, *PRA* **84** 022701 (2011)]
 - Ar^{3+, 4+, 7+, 8+, 10+, 11+, 12+, 13+, 14+,17+} {BP-RM}
 - [Ludlow et al. *JPB* **43** 074029 (2010)]
 - H-like Mn, Cr, Fe, Co and Ni {ICFT-RM}
 - [Malespin et al. *A&A* **526** A115 (2011)]
 - B⁴⁺ (n≤7) {LS-RM}

- Electron-impact ionization
 - Al^{2+} ground term {RMPS}
 - [Wu et al. PRA (in press)]
 - C^{3+} 5s {RMPS, DW}
 - [Pindzola PRA **83** 062705 (2011)]
 - B ($n \leq 4$), B^+ ($n \leq 4$), B^{2+} ($n \leq 5$) {RMPS, TDCC}
 - [Lee et al. PRA **82** 042721 (2010)]
 - Showed how to scale direct ionization cross sections to higher n-shells.
 - Xe^{24+} ground configuration {CADW, RMPS}
 - [Pindzola et al. JPB **43** 025201 (2010)]
 - C_2
 - [Pindzola et al. JPB **43** 065201 (2010)]
 - Double ionization of
 - B^+ {TDCC, RMPS} [Pindzola et al. JPB **44** 105202 (2011)]
 - Be {TDCC, RMPS} [Pindzola et al. JPB **43** 105204 (2010)]

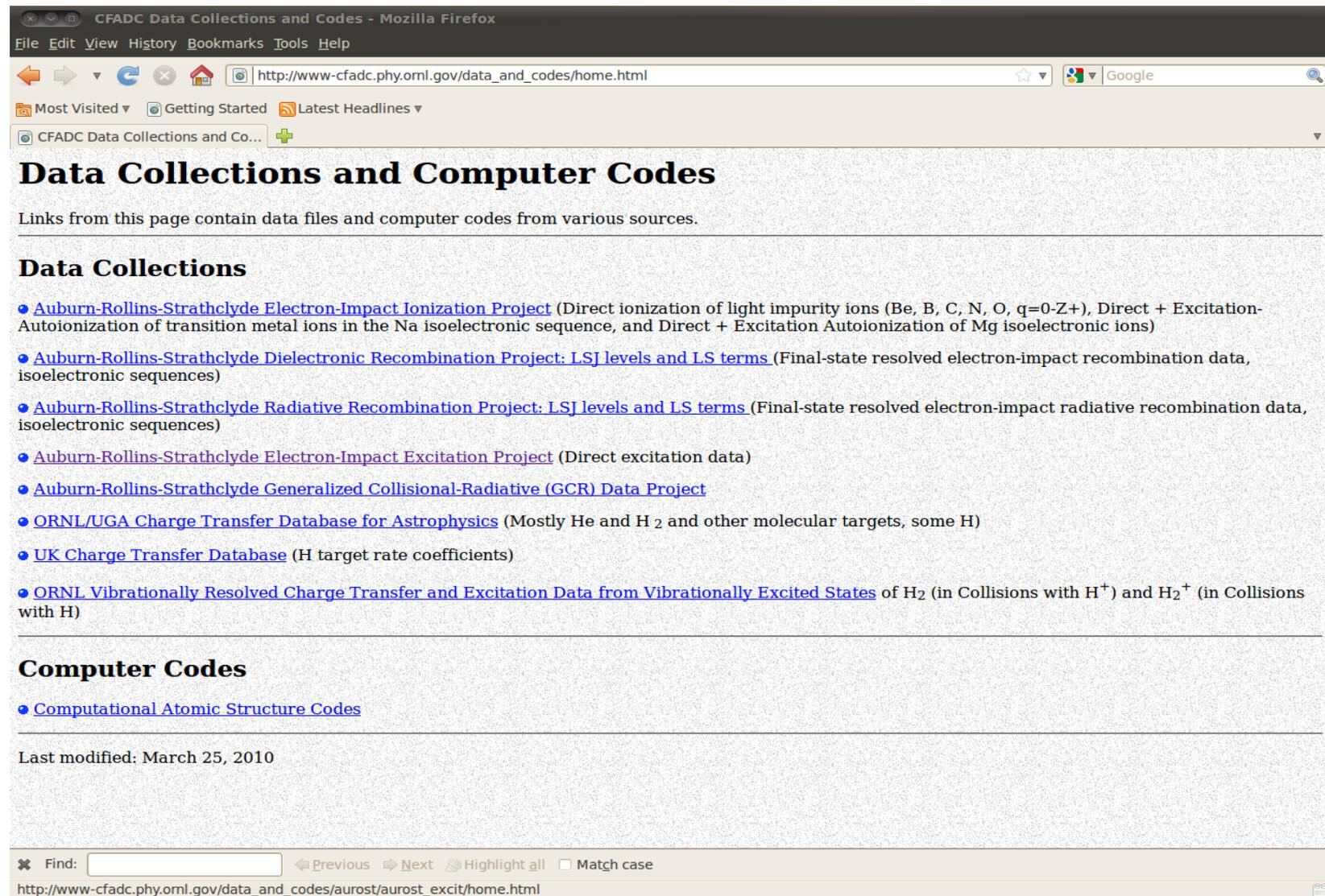
- Dielectronic recombination
 - New adf09 files
 - Ar-like iso-electronic sequence [Nikolic et al. *A&A* 516 A97 (2010)]
 - Al-like iso-electronic sequence [Abdel-Naby et al., submitted]
 - W^{35+} [Ballance et al. *JPB* **43** 205201 (2010)]
 - Studies on near threshold DR
 - $Mg^{8+} \rightarrow Mg^{7+}$ [Robicheaux et al., *PRL* **105** 233201 (2011)]
 - $C^{3+} \rightarrow C^{2+}$ [Pindzola et al., *PRA* **83** 042705 (2011)]
 - Comparison with experiment
 - Be-like Si [Orban et al., *ApJ* **721** 1603 (2010)]
 - Be-like Ne [Orban et al., *Physica Scripta* **144** 014035 (2011)]

The future of the CFADC web page

- With the atomic group at Oak Ridge National Laboratory due to close, there is some interest in relocating their CFADC web page.
 - We hope to be able to move the database (with adf files and archives of rate coefficients) to Auburn.
 - Dave Schultz is hoping to relocate the bibliographic search engine.



Reminder of the data at CFADC



The screenshot shows a Mozilla Firefox browser window with the address bar displaying http://www-cfadc.phy.ornl.gov/data_and_codes/home.html. The page title is "CFADC Data Collections and Codes". The main heading is "Data Collections and Computer Codes". Below this, a paragraph states: "Links from this page contain data files and computer codes from various sources." The page is divided into two sections: "Data Collections" and "Computer Codes".

Data Collections

- [Auburn-Rollins-Strathclyde Electron-Impact Ionization Project](#) (Direct ionization of light impurity ions (Be, B, C, N, O, $q=0-Z+$), Direct + Excitation-Autoionization of transition metal ions in the Na isoelectronic sequence, and Direct + Excitation Autoionization of Mg isoelectronic ions)
- [Auburn-Rollins-Strathclyde Dielectronic Recombination Project: LSJ levels and LS terms](#) (Final-state resolved electron-impact recombination data, isoelectronic sequences)
- [Auburn-Rollins-Strathclyde Radiative Recombination Project: LSJ levels and LS terms](#) (Final-state resolved electron-impact radiative recombination data, isoelectronic sequences)
- [Auburn-Rollins-Strathclyde Electron-Impact Excitation Project](#) (Direct excitation data)
- [Auburn-Rollins-Strathclyde Generalized Collisional-Radiative \(GCR\) Data Project](#)
- [ORNL/UGA Charge Transfer Database for Astrophysics](#) (Mostly He and H₂ and other molecular targets, some H)
- [UK Charge Transfer Database](#) (H target rate coefficients)
- [ORNL Vibrationally Resolved Charge Transfer and Excitation Data from Vibrationally Excited States](#) of H₂ (in Collisions with H⁺) and H₂⁺ (in Collisions with H)

Computer Codes

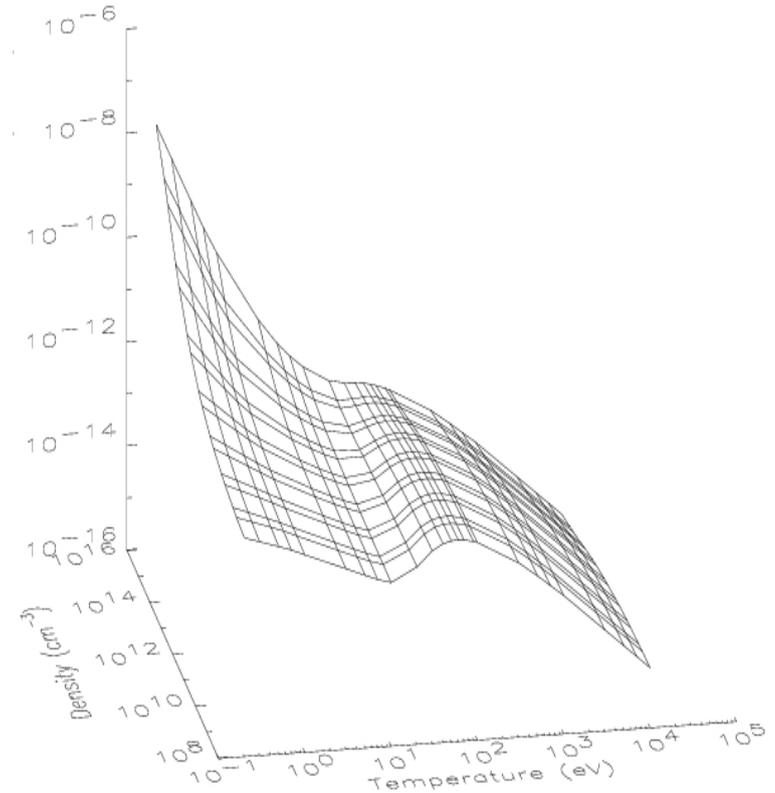
- [Computational Atomic Structure Codes](#)

Last modified: March 25, 2010

At the bottom of the browser window, there is a search bar with the text "Find:" and a search button. Below the search bar, there are navigation links: "Previous", "Next", "Highlight all", and "Match case". The address bar at the very bottom shows the URL http://www-cfadc.phy.ornl.gov/data_and_codes/aurost/aurost_excit/home.html.

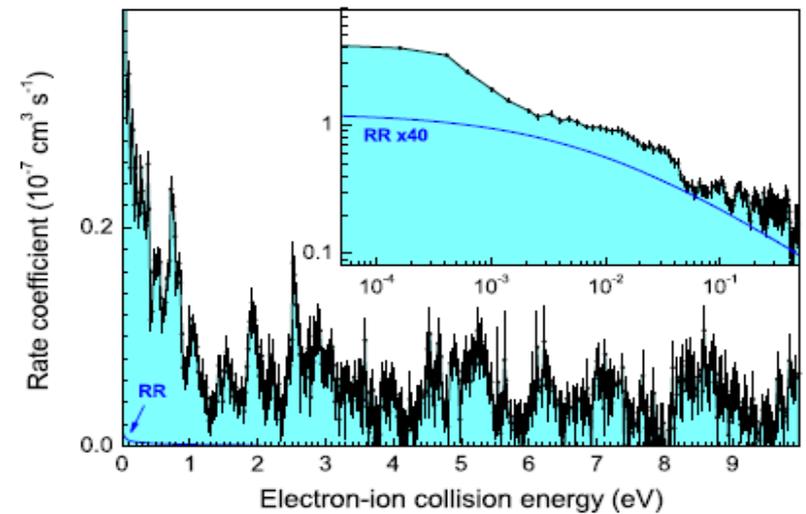
Future plans for Auburn

- Data for GCR coefficients
 - Put B GCR data into ADAS
 - To make C GCR we need
 - C, C⁺ excitation,
 - excited state ionization for C, C⁺, C²⁺
 - Move on to N, O, F, and Ne.
 - Work on R-matrix script for further sequences.
 - Heavy species GCR
 - Ar as an initial study

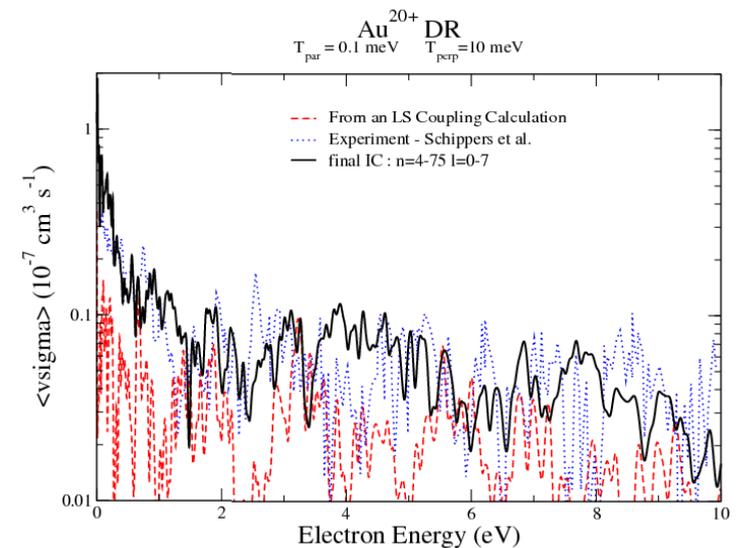


- Ionization

- Excited state ionization processes for near neutrals.
 - Excited states that have significant excitation-autoionization.
- Complete missing data for Al iso-nuclear [neutral Al]
- Iso-electronic sequence work using CADW script
 - Fe-peak elements [Mn, Cr, Fe, Co and Ni]
 - Automate the term and level-splitting in the script
 - Automate the generation of radiative branching ratios
- Dielectronic recombination for complex species.

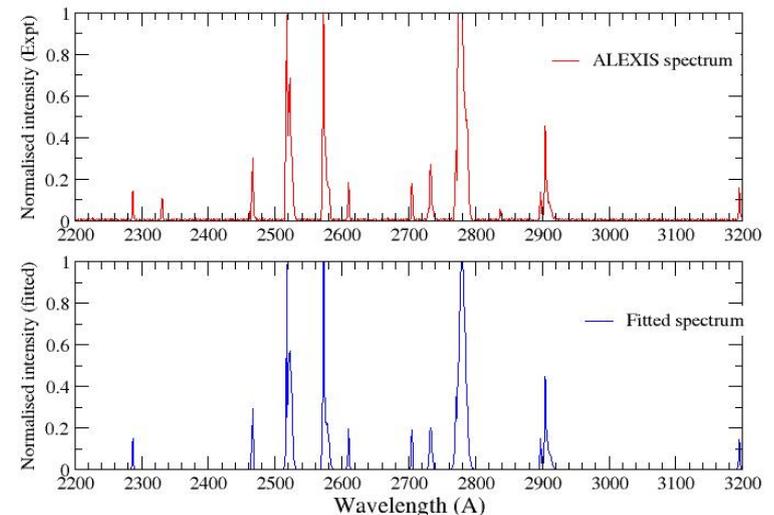


Storage ring measurements of Au²⁰⁺ DR. From Schippers et al. Physica Scripta **T144** 014039 (2011)



Interaction with the plasma group at Auburn

- We have projects with
 - Ed Thomas looking at non-equilibrium Ar plasma experiment (ALEXIS)
 - GCR data for Ar
 - Steve Knowlton looking at spectral signatures of magnetic islands on CTH
 - C GCR



Requests for atomic data gratefully taken!

- Let us know if
 - there is any atomic data that you need.
 - you have used our data in any modeling. Feedback would be welcome.