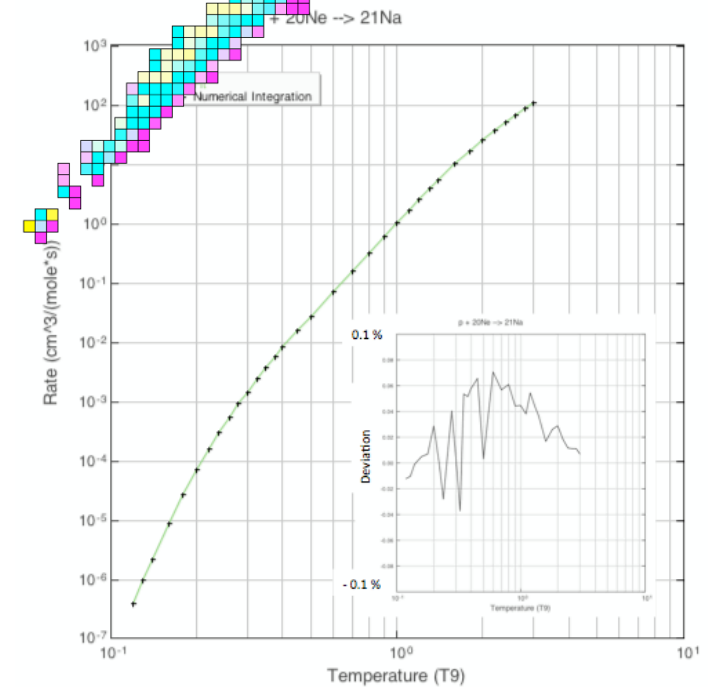
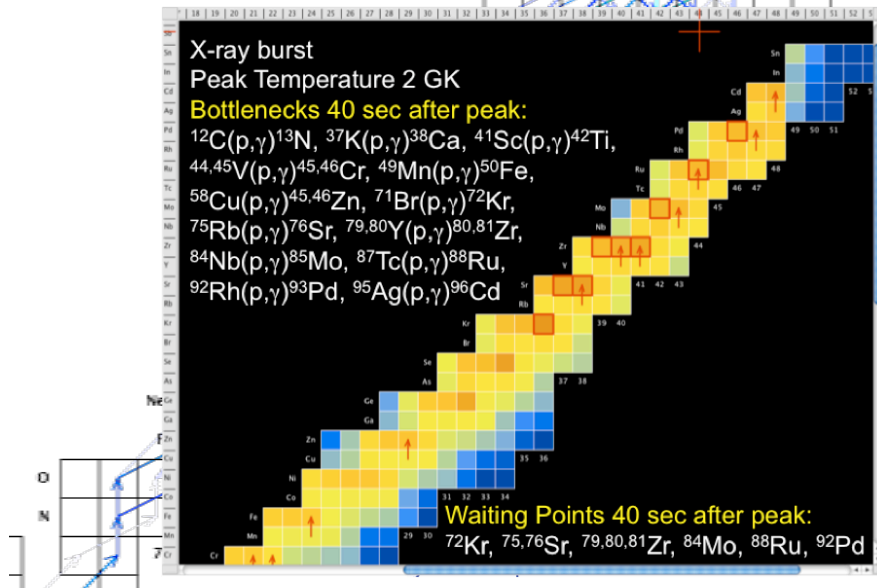
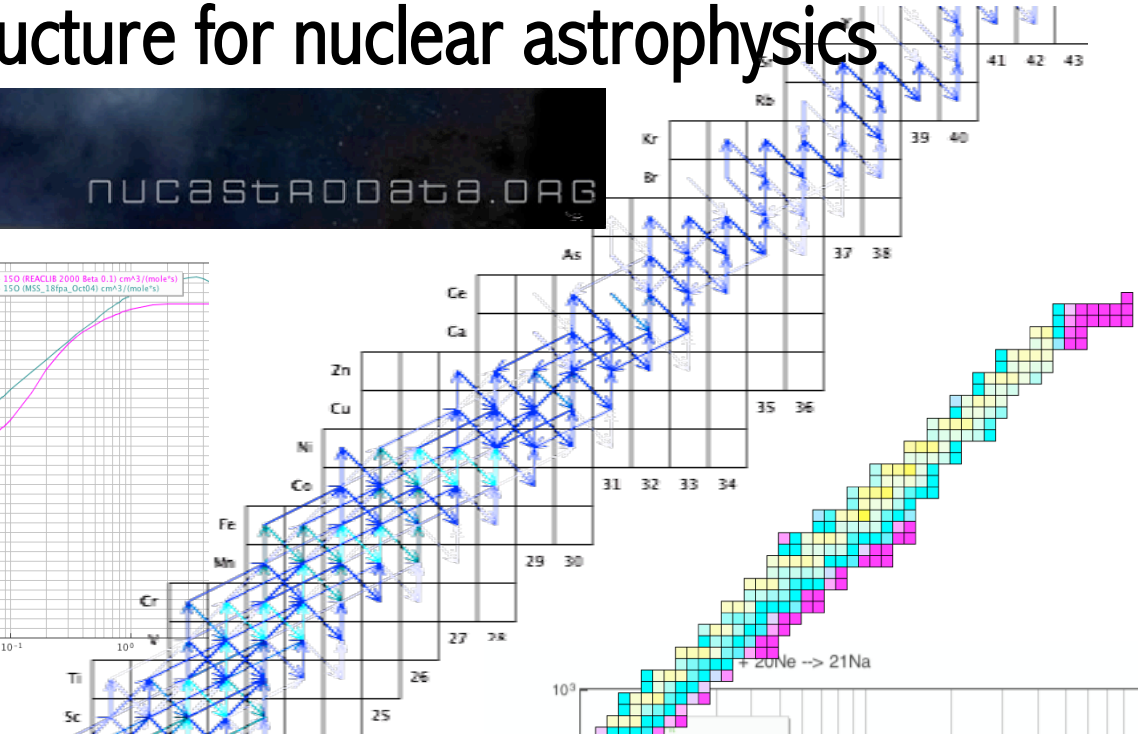
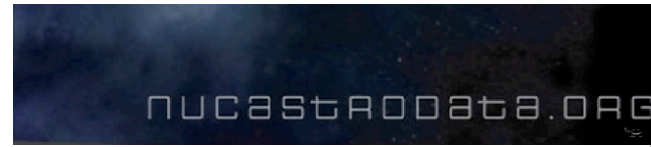
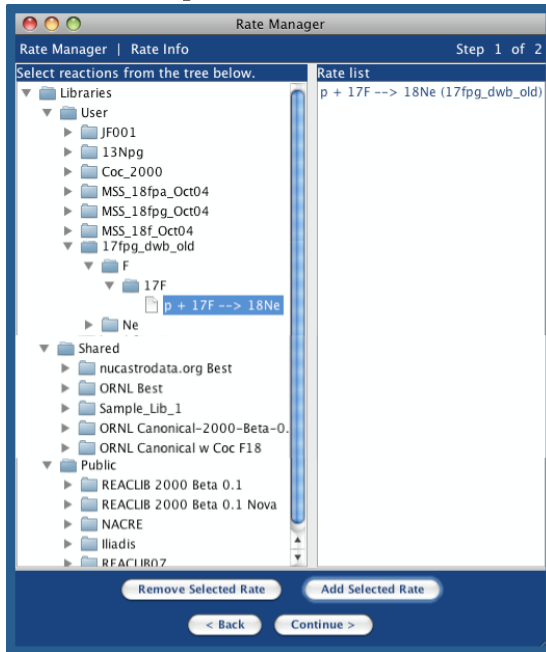


computational infrastructure for nuclear astrophysics



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sample investigations

before & after study: what was the impact of my measurement ?

- assume you just measured a new rate of the $^{18}\text{F}(\text{p},\alpha)^{15}\text{O}$ reaction
- rate is 10 times lower than previous “best” rate
- how does this impact predictions of ^{18}F production in novae ?

approach

- modify existing $^{18}\text{F}(\text{p},\alpha)^{15}\text{O}$ rate appropriately, save into new library
- combine with JINA REACLIB v2.0 into full library for a simulation
- choose a novae simulation, run with old rate & new rate
- compare final abundances in the two simulations
- draw your conclusion on the impact of the measurement
- variations: more nova models, different zones or all zones ...

sample investigations

sensitivity study: how does one abundance depend on a rate ?

- you just read an article on ^{22}Na observations in nova ejecta
- you wonder if measurements of $^{21}\text{Na}(p,\gamma)^{22}\text{Mg}$ and $^{21}\text{Ne}(p,\gamma)^{22}\text{Na}$ reaction would help clarify the nuclear uncertainties in ^{22}Na abundance predictions
- what are the sensitivities of these predictions on these rates ?

approach

- choose a reference rate library and a novae simulation
- choose a set of variations of these the reactions of interest (e.g., 0.01, 0.1, 1.0, 10, 100 ...)
- use automated sensitivity study tool to vary rate and run simulations
- use tools to plot out abundance vs. rate, look for strong correlations
- variations: more nova models, different rate variations, change other rates on neighboring nuclei ...

sample investigations

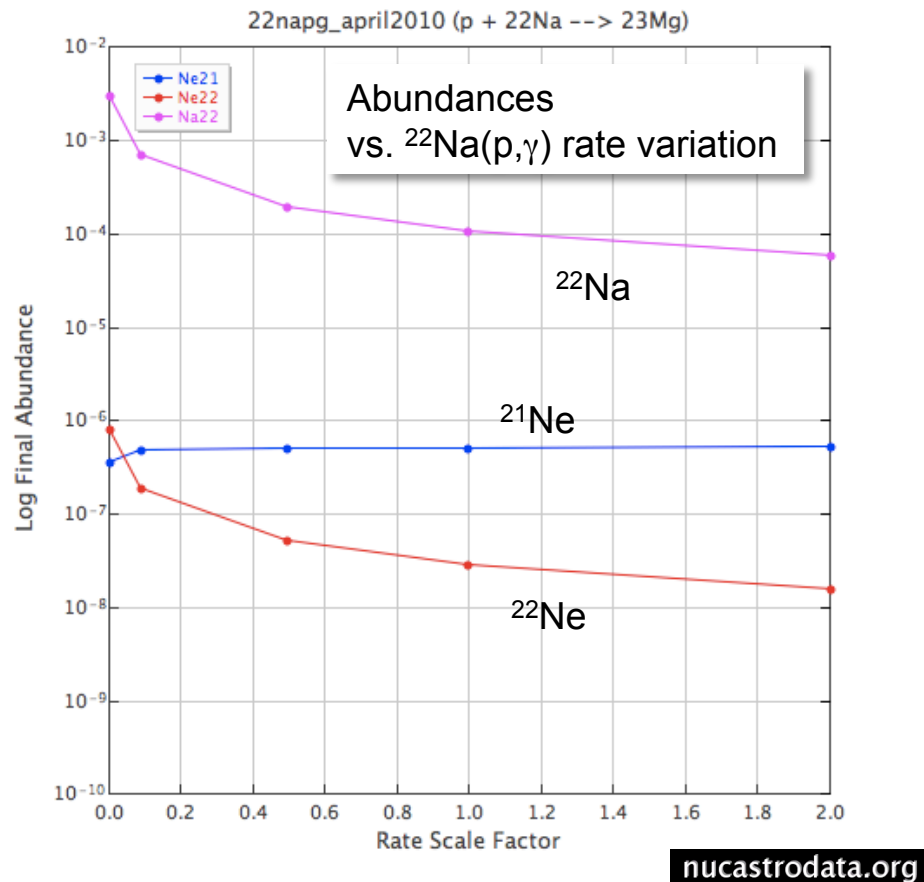
uncertainty analysis: what is the uncertainty of this predicted abundance ?

- you have just made a new measurement of the $^{14}\text{O}(\alpha, p)^{17}\text{F}$ reaction with an uncertainty that ranges from a factor of 2 higher to a factor of 20 lower
- what are the implications of this uncertainty for final abundance predictions in novae ?

approach

- modify $^{14}\text{O}(\alpha, p)^{17}\text{F}$ rate to have “max” and “min” values
- save each into library, merge with JINA REACLIB v2.0 library
- choose a novae simulation, run with reference, max, & min rates
- compare final abundances, the spread gives the uncertainty
- draw your conclusion on the impact of the uncertainty on $^{16}\text{O} / ^{18}\text{O}$ and $^{17}\text{O}/^{18}\text{O}$ abundance ratios, on ^{18}F and ^{22}Na abundances ...
- variations: examine different abundances; different nova models ...

computational infrastructure for nuclear astrophysics



Bottleneck Reaction Finder

Bottleneck Reaction Finder | Results Step 3 of 3

Below is a list of reactions that are bottlenecks for the synthesis of nuclei with masses greater than or equal to the Bottleneck Mass. Click *Submit Bottleneck Reactions* to visualize these results with the Animator. Click *Close Bottleneck Reaction Finder* to close the Bottleneck Reaction Finder and not submit the results. Check *View Detailed Report* to view the user input as well as the output of the Finder.

Bottleneck Reaction Finder Report: ☐ View Detailed Report

81	$80\text{Y} \rightarrow 81\text{Zr}$	Major Bottleneck
85	$84\text{Nb} \rightarrow 85\text{Mo}$	Major Bottleneck
88	$87\text{Tc} \rightarrow 88\text{Ru}$	Major Bottleneck

Save Copy Print

Submit Bottleneck Reactions

< Back Close Bottleneck Reaction Finder

- download java program for free at nucastrodata.org
- contact coordinator @ nucastrodata.org for help
- suggest new features for nuclear data / rates / libraries / simulations / visualization / analysis and we will work with you !