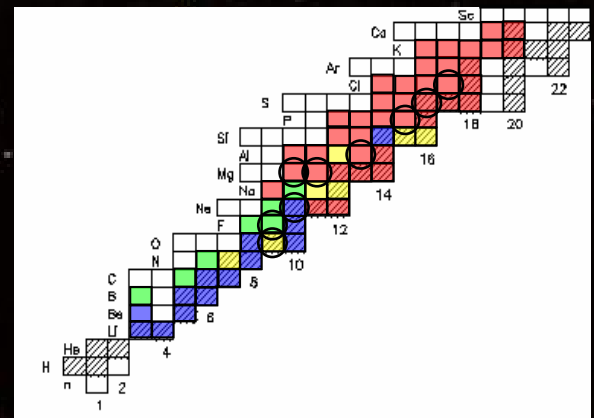


CLASSICAL NOVA NUCLEOSYNTHESIS: EXPERIMENT

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UNIVERSITY OF NORTH CAROLINA

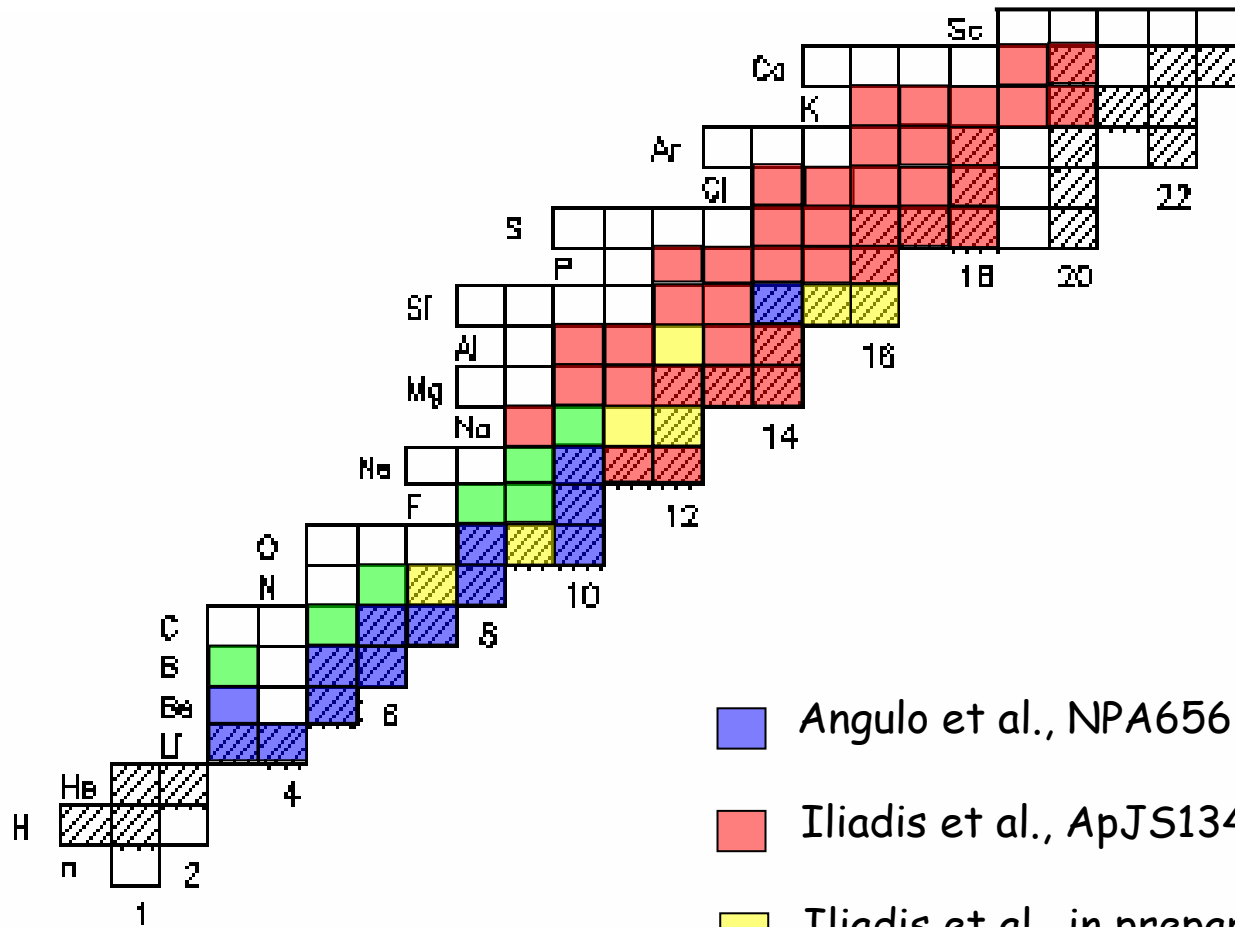


1. Classical novae involve a **restricted** number of nuclear reactions.

...as opposed to other explosions such as type II SN, type I xrb



PRESENT BACKBONE OF REACTION RATES



Blue: Angulo et al., NPA656,3 (1999) NACRE

Red: Iliadis et al., ApJS134, 151 (2001)

Yellow: Iliadis et al., in preparation

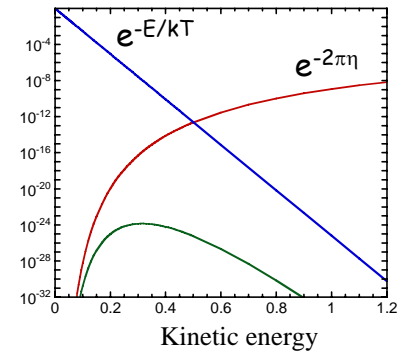
Green: Other (Oak Ridge/ISAC/TAMU etc.)



2. Novae are the only stellar explosions for which the nuclear physics input is mainly based on **experiment**.



Gamow peak location at $T=300$ MK:



	$E_0 \pm \Delta/2$ (keV)	$E_{Rmin,exp}$ (keV)
$^{17}\text{O}(p,\gamma)^{18}\text{F}$:	215 ± 86	183 keV
$^{31}\text{P}(p,\gamma)^{32}\text{S}$:	329 ± 106	195 keV

3. **Direct** laboratory measurements of nuclear reactions in the nova Gamow peak are feasible with present techniques.



THE EFFECTS OF THERMONUCLEAR REACTION-RATE VARIATIONS ON NOVA NUCLEOSYNTHESIS: A SENSITIVITY STUDY

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SUMNER STARRFIELD

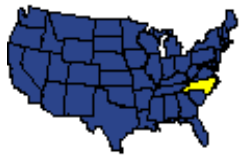
Department of Physics and Astronomy, Arizona State University, Tempe, AZ 85287-1504; sumner.starrfield@asu.edu

AND

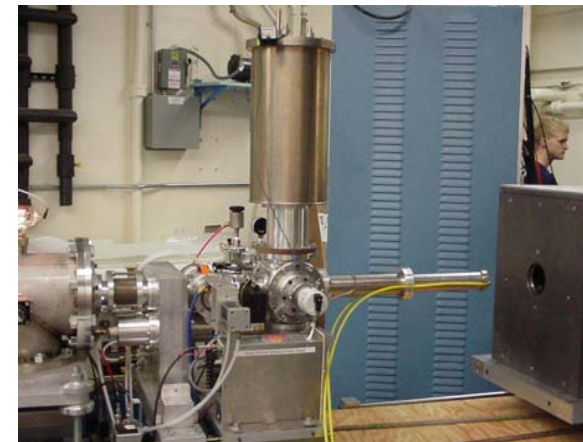
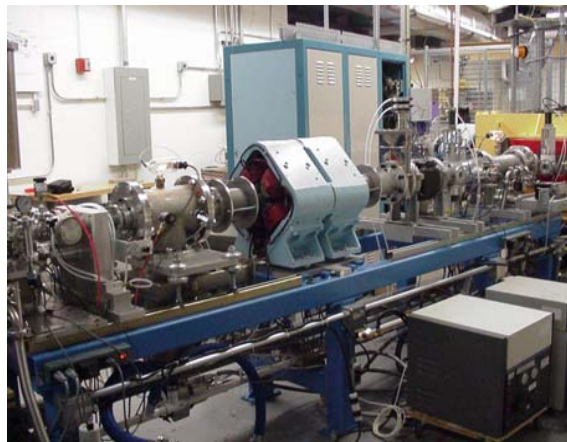
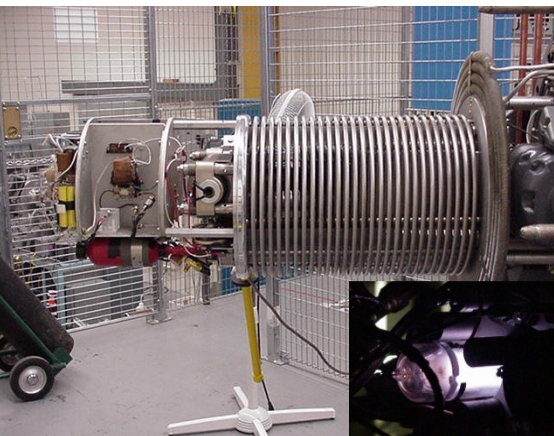
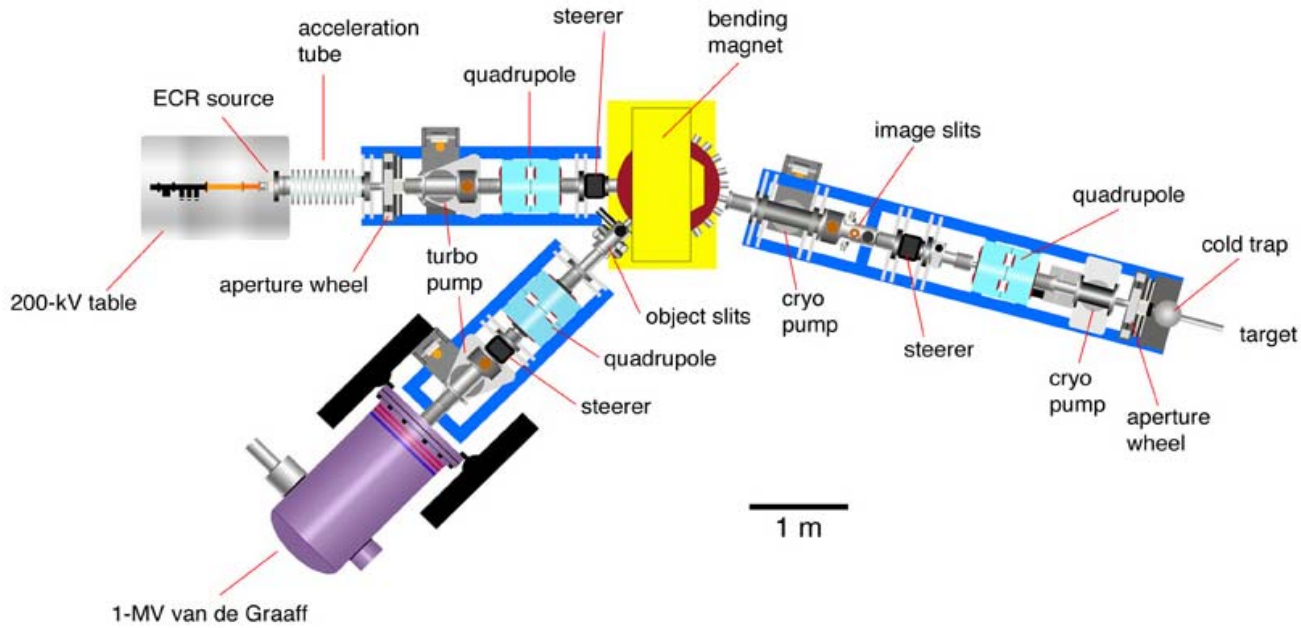
PAUL TUPPER

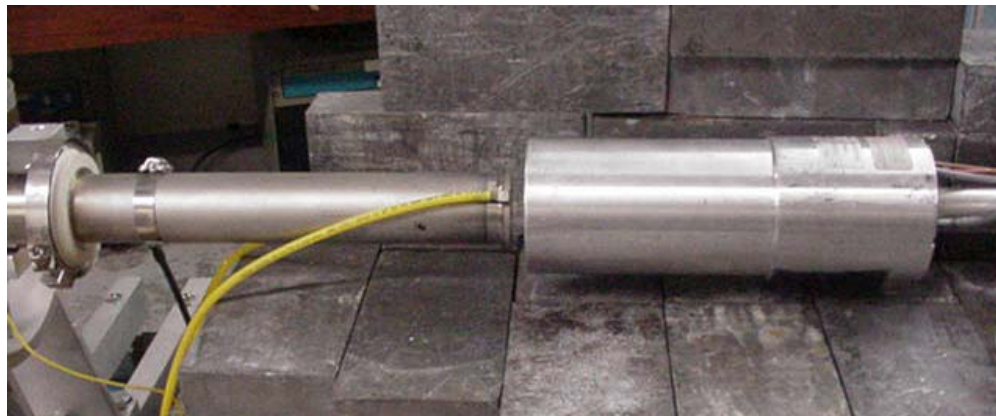
Scientific Computing–Computational Mathematics Program, Stanford University, Stanford, CA 94305; tupper@sccm.stanford.edu

Received 2002 January 19; accepted 2002 April 25

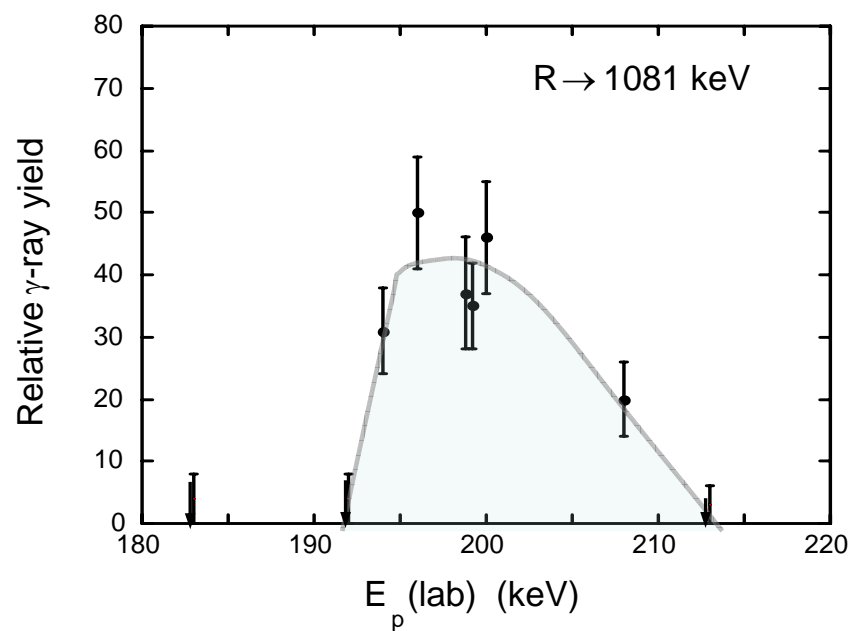
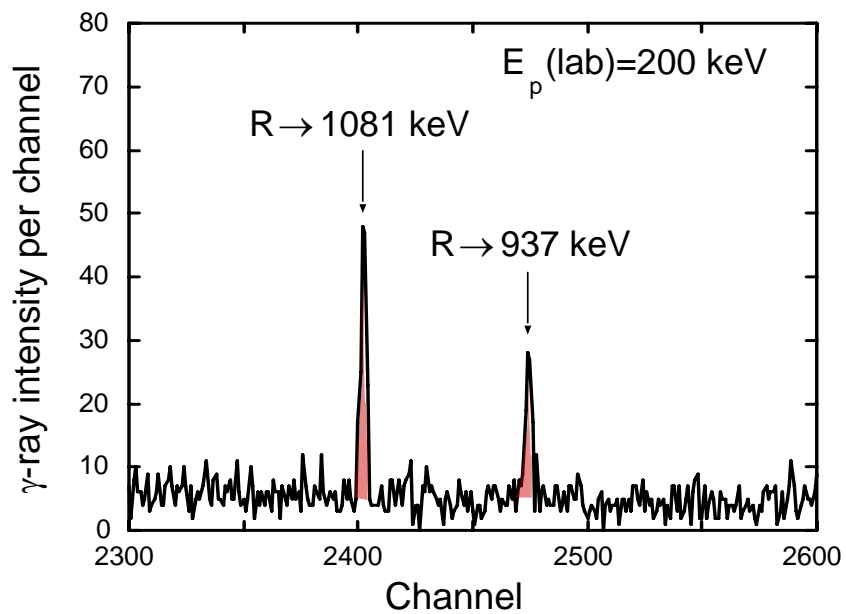


LABORATORY FOR EXPERIMENTAL NUCLEAR ASTROPHYSICS (LENA)



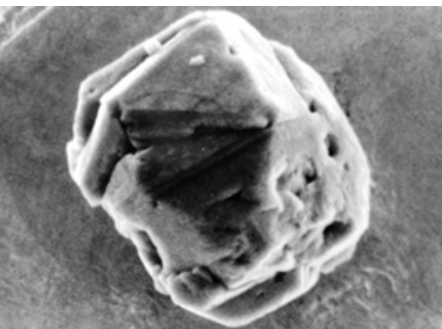
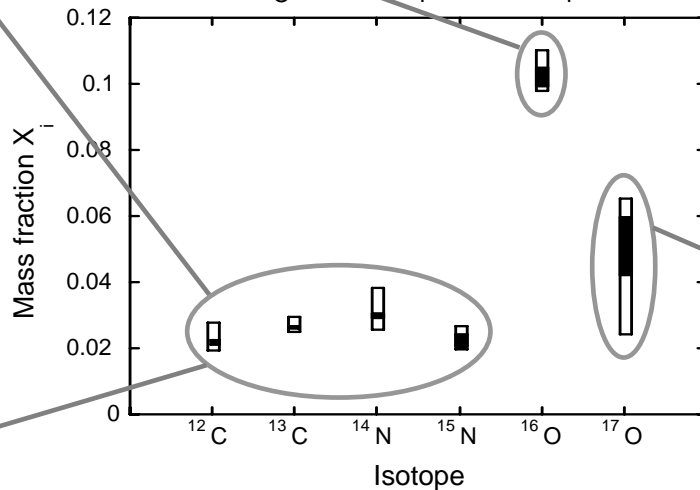
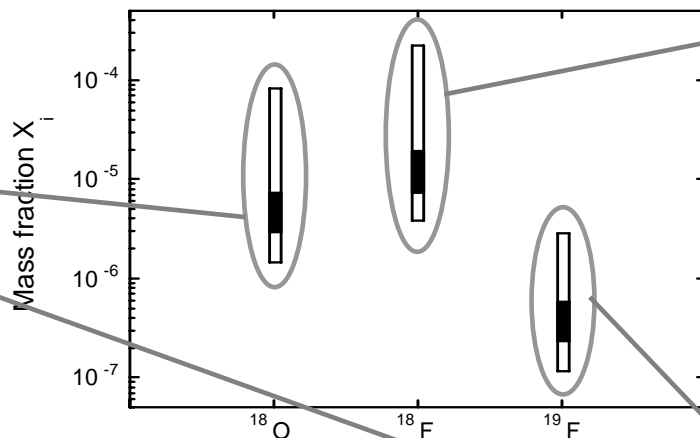
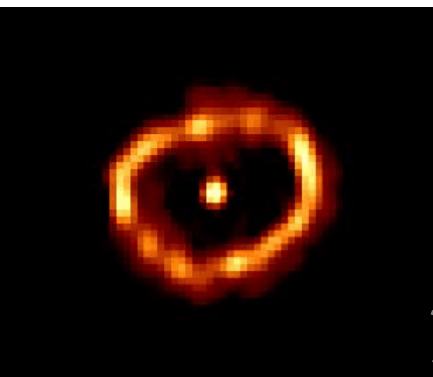


NEW $E_R=190$ keV RESONANCE IN THE REACTION: $^{17}\text{O}+p\rightarrow^{18}\text{F}+\gamma$ □



Explosive Hydrogen Burning of ^{17}O in Classical Novae

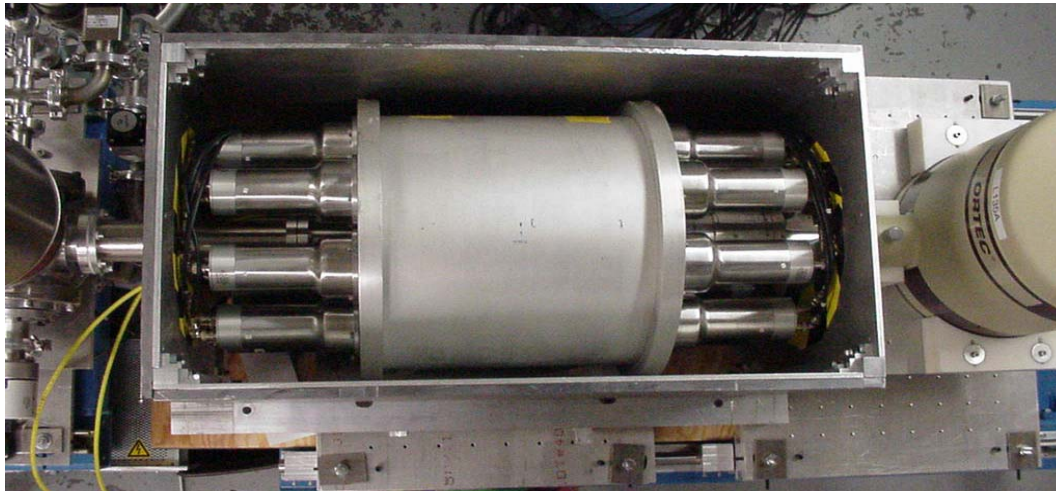
C. Fox,^{1,2} C. Iliadis,^{1,2} A. E. Champagne,^{1,2} A. Coc,³ J. José,⁴ R. Longland,^{1,2} J. Newton,^{1,2}
J. Pollanen,^{1,2} and R. Runkle^{1,2}



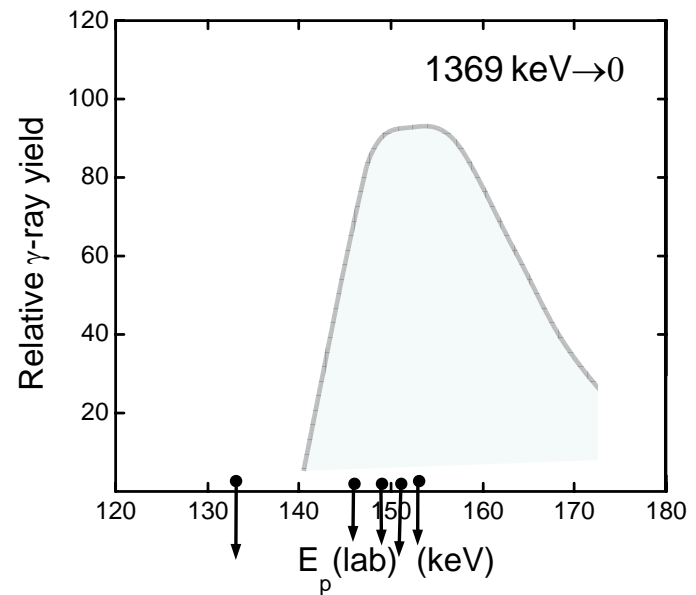
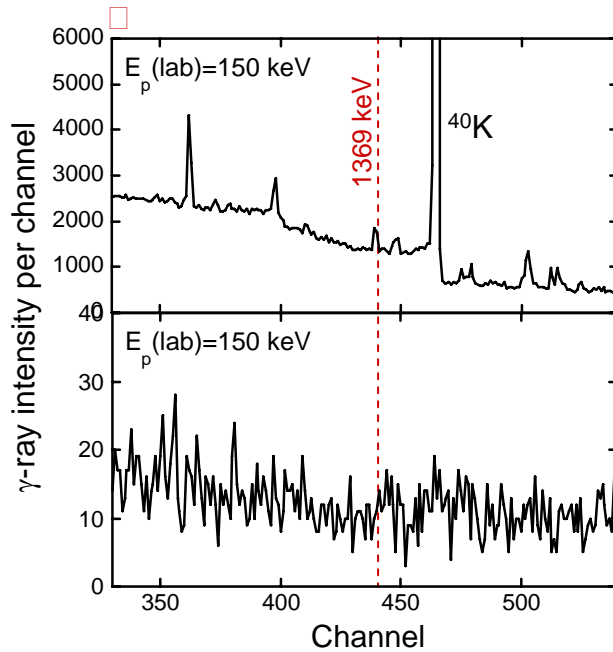
0339 SKU X16,000 1µm WD 8
Scale bar is 1 µm. (Photo courtesy of S. Amari.)



JACK SCHMIDLING



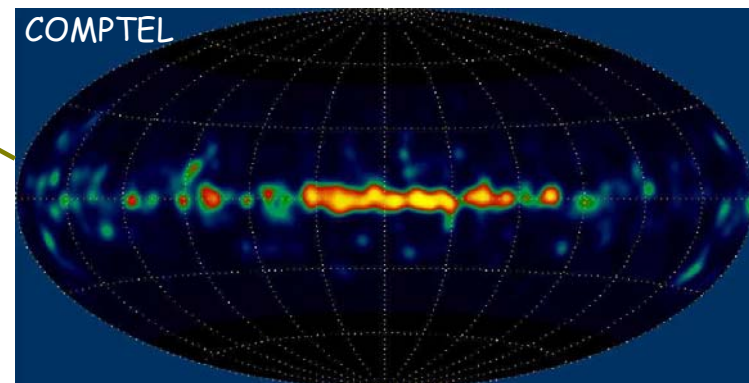
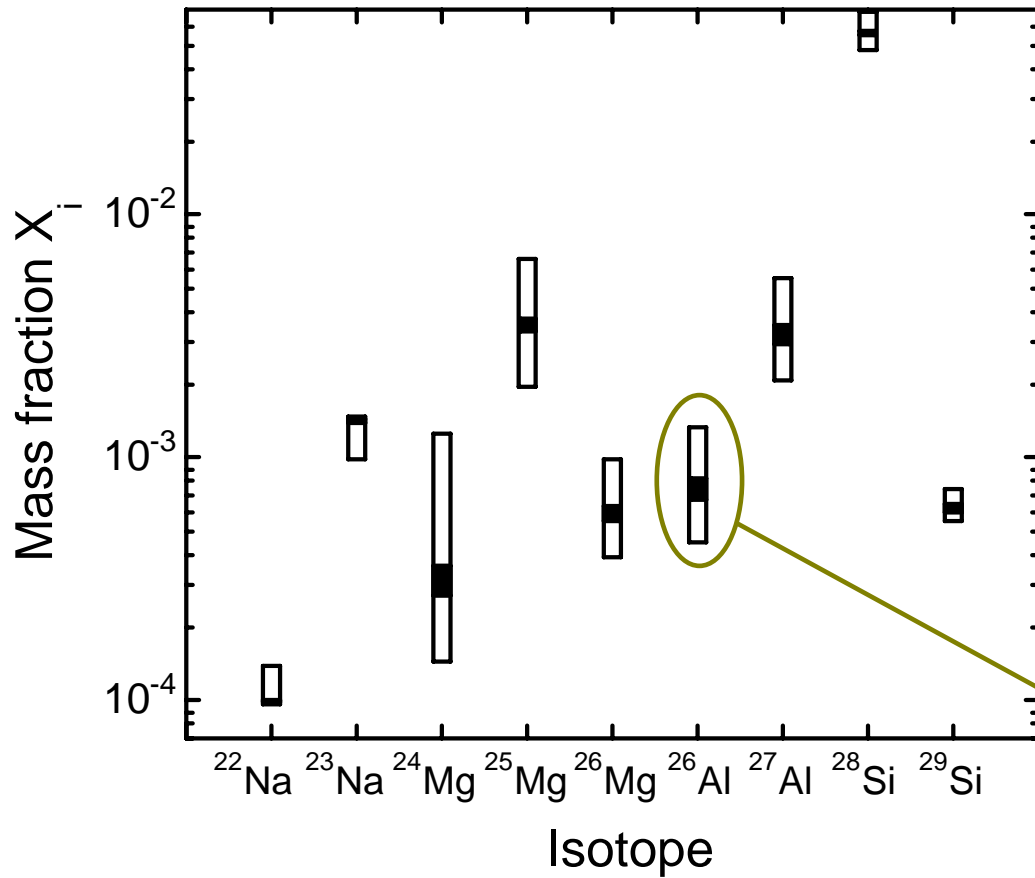
NEW $E_R=140$ keV RESONANCE IN THE REACTION: $^{23}\text{Na}+p \rightarrow ^{24}\text{Mg}+\gamma$

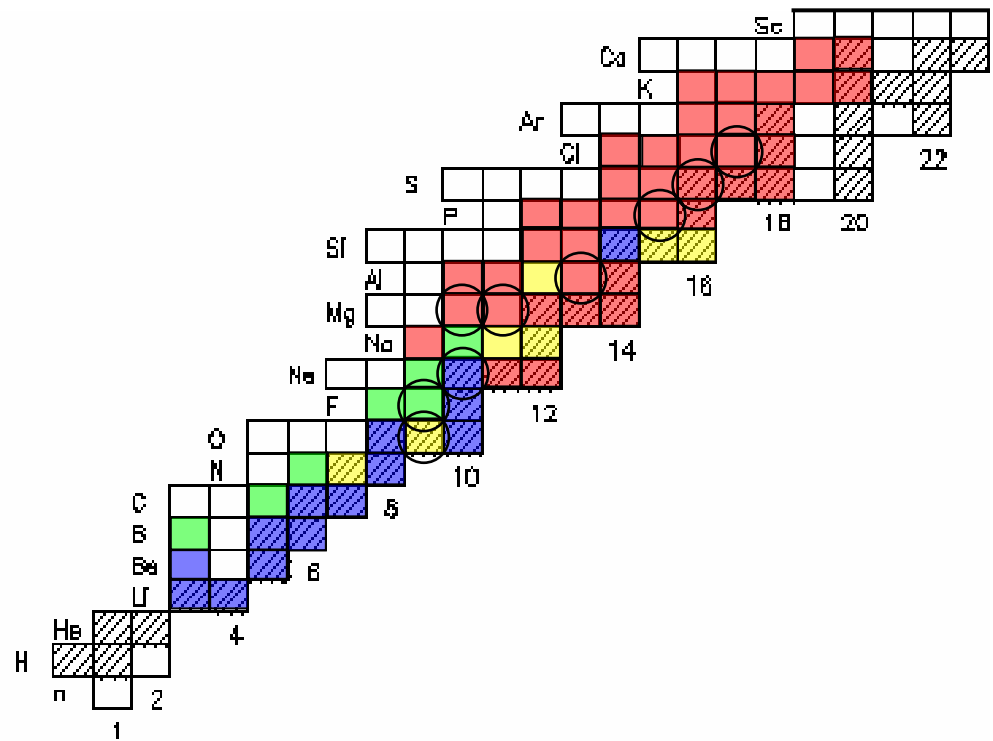


DOES AN NeNa CYCLE EXIST IN EXPLOSIVE HYDROGEN BURNING?

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Near future:

Measurement of more reactions...
(Argonne/ISAC/LENA/ Louvain/Oak Ridge)

Use our new rate library in hydro studies...
(in collaboration Starrfield/Hix and Jose/Hernanz/Coc)

