KADoNiS

The "Karlsruhe Astrophysical Database of Nucleosynthesis in Stars"

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Clever Acronyms: the Holy Grail of Academia

Step 1 Use the loose definition of the word "acronym"

Step 2 Is it coherent? Does it makes sense? What matters is that it *sounds* cool.

Step 3 Missing a letter? Pull out an obscure buzzword that fits!

Step 4 Desperate? Just pick letters from the middle. I'm sure no one will notice.

Step 5 Ignore words that don't contribute. Kind of like your part in the project.

ACtually Random Onomastic iNitials You Make (up)

Types of Acronyms:

- **Folksy Names:** a cheery name will distract people from the fact your project cost millions	→	A.L.I.C.E., B.O.B., D.A.V.E. ✓	A.D.O.L.F., Z.I.P.P.O., S.I.G.M.U.N.D. ✗
- **Aggressive verb/predatory animal:** a requirement for getting military funding	→	K.I.L.L., S.H.A.R.K., W.O.L.F. ✓	O.B.L.I.T.E.R.A.T.E. (too many words!), B.U.N.N.Y. ✗
- **Greek names:** nothing says "Sci-Fi" like a good greek name	→	O.M.E.G.A., A.L.P.H.A., S.I.R.I.U.S. ✓	T.O.G.A., P.I.T.A., T.Z.A.T.Z.I.K.I. ✗

Remember:
Acronyms cleverly reveal one's nimble youthful mastery abbreviating construed rigidly opted nomenclature, yielding monetary awards contracting research overtures not yet manifested!

Bonus points: make your acronym recursive!
recursive
recursive
recursive

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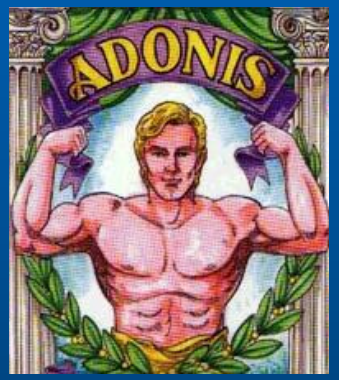

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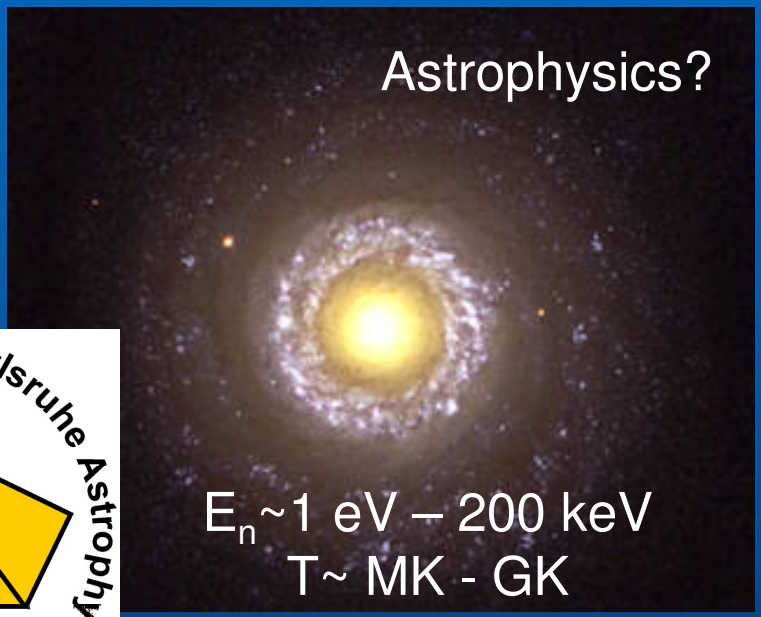

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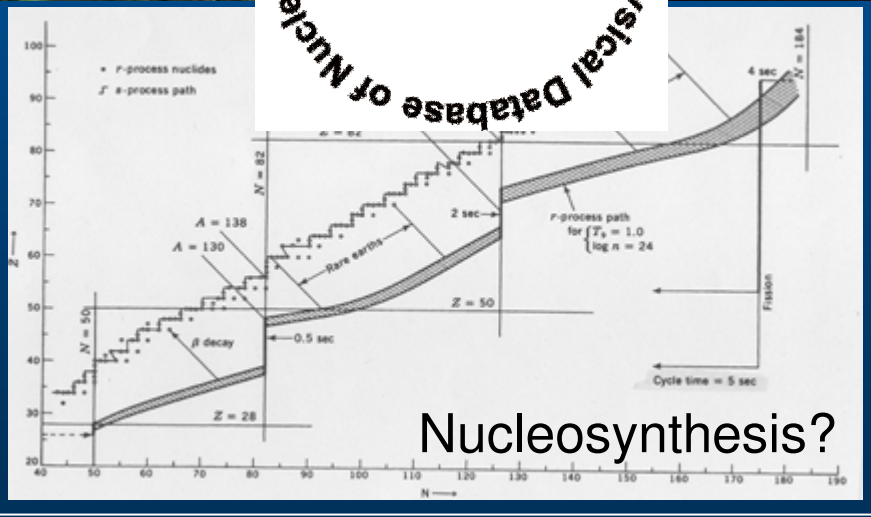
KADoNiS



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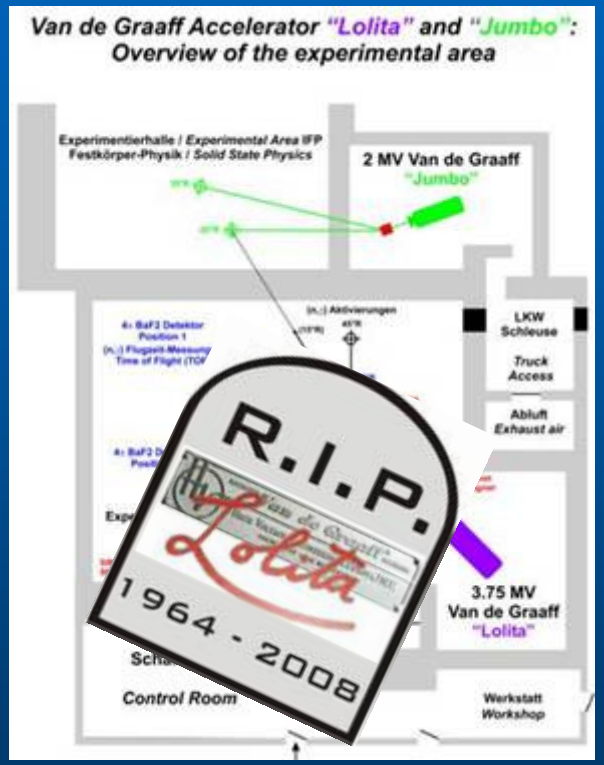

~~www.nuclear-astrophysics.tzk.de/kadonis~~

www.kadonis.org

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History of stellar neutron capture compilations

Pioneering work: 1971

B.J. Allen, R.L. Macklin, J.H. Gibbons,
Adv. Nucl. Phys. 4 (1971) 205

⇨ Review of the role of neutron capture reactions in the nucleosynthesis of heavy elements

- Collection of recommended MACS at $kT = 30$ keV
- Range: C - Pu
- Semi-empirical estimates for isotopes without exp. MACS

The 1st Bao Compilation (1987)

NEUTRON CAPTURE CROSS SECTIONS FOR s-PROCESS STUDIES

Z. Y. BAO* and F. KÄPPELER

Kernforschungszentrum Karlsruhe GmbH
Institut für Kernphysik, Postfach 3640
D-7500 Karlsruhe, Federal Republic of Germany

Existing experimental and calculated neutron capture cross sections in the keV energy range have been surveyed, properly renormalized if necessary, and converted into Maxwellian averages over stellar neutron spectra characterized by thermal energies between 10 and 50 keV. This compilation includes all isotopes involved in the slow neutron capture process (s-process) of nucleosynthesis between ^{12}C and ^{209}Bi as well as the longer-lived actinide isotopes which might have been modified by the s process. Gaps in the experimental data were covered with calculated cross sections, which are particularly important in the case of radioactive nuclei and for estimating the effect of thermally populated excited states. From the entire body of evaluated data a current best set of cross sections is recommended for use in s-process studies.

Z.Y. Bao and F. Käppeler, ADNDT 36 (1987) 411

⇨ Collection of recommended MACS at kT= 30 keV for s-process studies:

- (n,γ) for isotopes between ^{12}C and ^{209}Bi
- (n,p) and (n,α) reactions between ^{33}S and ^{59}Ni
- (n,γ) and (n,f) of long-lived actinides

Follow-up compilation:

ON THE CALCULATION OF MAXWELLIAN-AVERAGED CAPTURE CROSS SECTIONS

HERMANN BEER AND F. VOSS
Kernforschungszentrum Karlsruhe, Institut für Kernphysik III, P.O. Box 3640, D-7500 Karlsruhe 1, Germany
AND
R. R. WINTERS
Department of Physics and Astronomy, Denison University, Granville, OH 43023
Received 1991 June 10; accepted 1991 September 24

Astrophys. Journ. Suppl. 80 (1992) 403

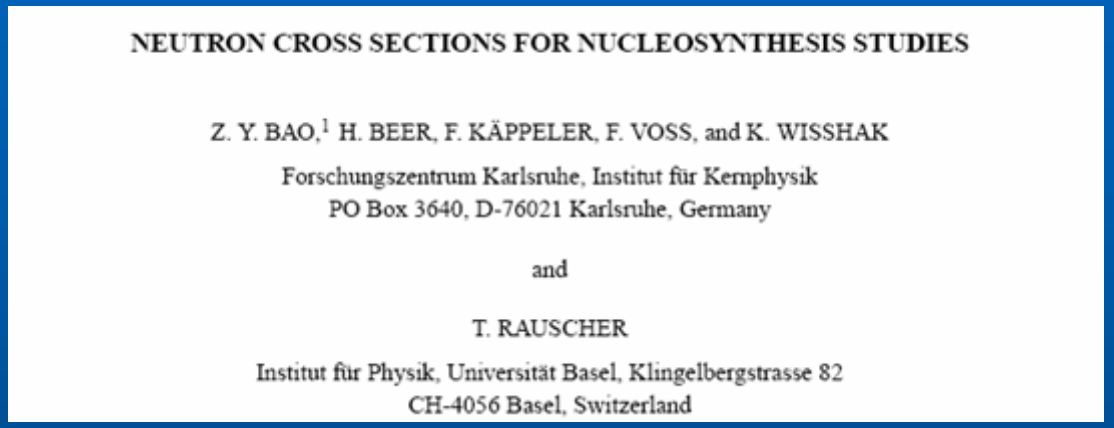
The 2nd Bao Compilation (2000)

Z.Y. Bao, H. Beer, F. Käppeler, F. Voss, K. Wisshak, and T. Rauscher, ADNDT 76 (2000) 1

⇨ Collection of recommended MACS at kT = 30 keV for big bang and s-process studies

⇨ Range: ^{1}H – ^{209}Bi

The 2nd Bao Compilation (2000)



NEUTRON CROSS SECTIONS FOR NUCLEOSYNTHESIS STUDIES

Z. Y. BAO,[1] H. BEER, F. KÄPPELER, F. VOSS, and K. WISSHAK

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and

T. RAUSCHER

Institut für Physik, Universität Basel, Klingelbergstrasse 82
CH-4056 Basel, Switzerland

ADNDT 76 (2000) 1

In collaboration with T. Rauscher (Uni Basel, NON-SMOKER):

⇨ Semi-empirical estimates for isotopes without experimental MACS (norm. xs from NON-SMOKER accounting for known systematic defienciencies in the nuclear input of the calculation)

⇨ Tabulated stellar enhancement factors

⇨ Tabulated MACS vs. kT (5 keV≤ kT≤ 100 keV)

www.kadonis.org

Online library of cross sections relevant for Big Bang, s-process and p-process studies

I. Dillmann, M. Heil, F. Käppeler, R. Plag, T. Rauscher, and F.-K. Thielemann, AIP Conference Proc. 819, 123 (2006)

(n,γ), [(n,p), (n,α)]
kT= 5-100 keV

big bang, s process

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(p,γ), (p,n), (p,α), (α,γ), (α,n), (n,γ) and inverse within Gamow window

p process

PART 1:

Update of Bao et al. compilation (2000)

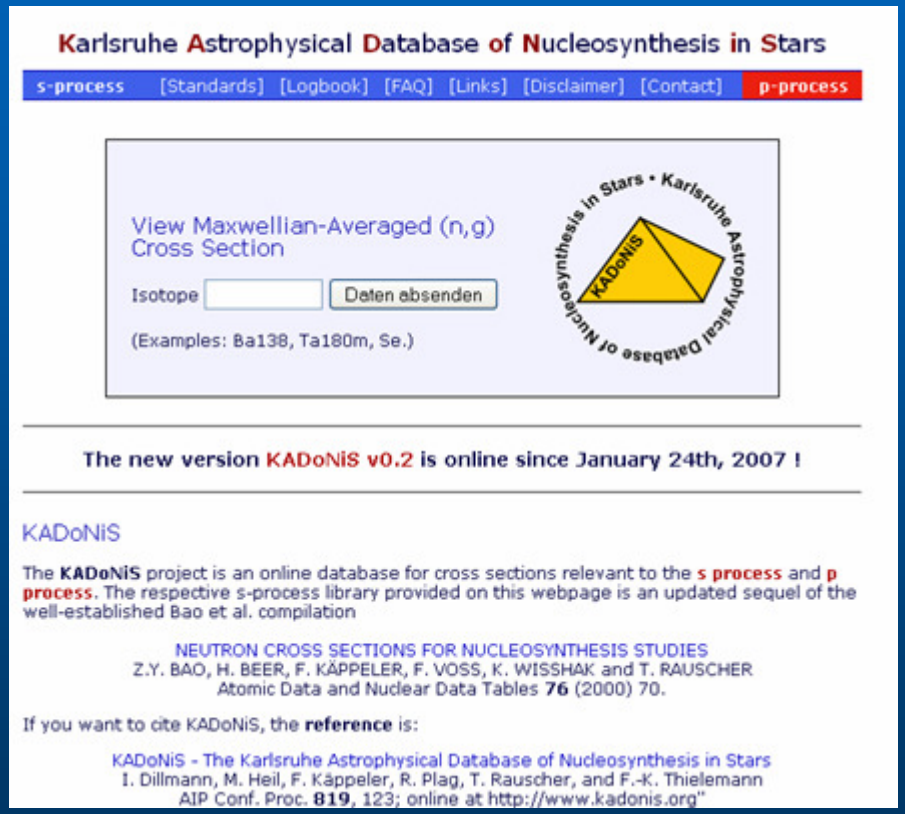
ONLINE SINCE APRIL 2005

PART 2:

Experimental p-process database

UNDER CONSTRUCTION

www.kadonis.org



KADoNiS v0.0: April 2005

(= Bao et al. 2000)

355 datasets

between ^{1}H and ^{210}Po

89 (25%) only theoretical

KADoNiS v0.1: Jan. 2006

KADoNiS v0.2: Jan. 2007

⇨ **38 updated** exp. MACS

⇨ **14 new** exp. MACS

75 (21%) only theoretical

KADoNiS v0.3: June 2009

KADoNiS v1.0: 2010

(ADNDT paper version)

KADoNiS Datasheet

available isotopes

References

Recommended values

Karlsruhe Astrophysical Database of Nucleosynthesis in Stars

s-process [Standards] [Logbook] [FAQ] [Links] [Disclaimer] [Contact] p-process

Go to isotope Go!

^{74}Se ^{76}Se ^{77}Se ^{78}Se ^{79}Se ^{80}Se ^{82}Se (Selenium, Z=34)

Isotope	Reaction	Product
74Se	n,gamma	75Se

Recommended values:

Total (n,γ) cross section (MACS30):	271 (15)	mb
Partial c.s. to ground state (MACS30):	-	mb
Partial c.s. to isomer (MACS30):	-	mb

Cross sections do not include stellar enhancement factors!

Comment:

Previous recommended cross section was 267 (25)* mb.
Previous MACS vs. kT table multiplied by 1.015.
Last review: January 30th, 2006

List of all available values:

original	renorm.	year	type	Comment	Ref
271 (15)		2006	c	VdG, Act., Au:RaK88	DHK06a
160		1971	s		AGM71
201		2000	t		RaT99
96 (31)		1988	t		ZZC88
193		1981	t		Har81
360		1978	t		WFH78
301		2002	t	MOST 2002	Gor02
245		2005	t	MOST 2005	Gor05

Original: MACS [$<\sigma v>/v_T$] (mb) for kT=30 keV, based on the published cross sections except where indicated otherwise.
Renorm: MACS [$<\sigma v>/v_T$] (mb) for kT=30 keV for which the reference or standard cross section was meanwhile improved.
Type: The letters and numbers in the column labelled 'type' give information on how the cross section has been obtained:

c	Directly quoted from the reference itself
s	Semiempirical estimates given in the reference
t	Theoretical value

MACS, SEF and Reaction Rates for different energies:

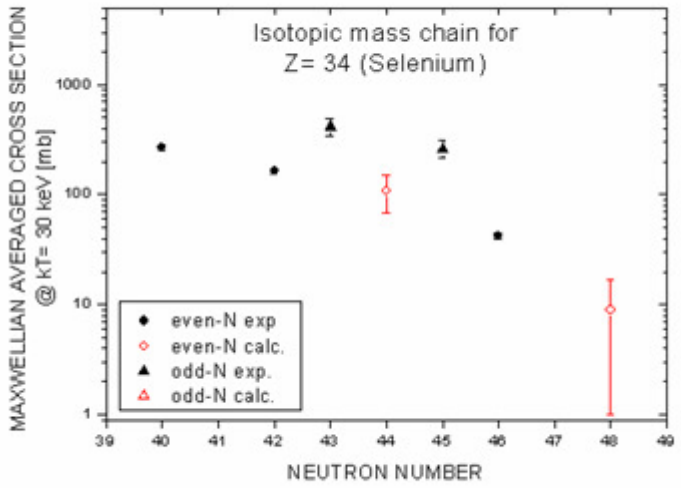
Energy	5keV	10keV	15keV	20keV	25keV	30keV	40keV	50keV	60keV	80keV	100keV
MACS	687	473	384	332	296	271 (15)	235	212	195	173	159
SEF (1)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.999
Rate (2)	4.09	3.98	3.96	3.95	3.94	3.95	3.96	3.99	4.02	4.12	4.23

Reference: DHK06a,RaT99
Procedure: 'e+t' (The MACS from kT=5 keV to 100 keV are derived from **calculated** cross sections, which are then **normalized** to experimental data, e.g. to the values at kT=25 keV obtained in activation measurements. In these cases the uncertainties should be linearly

KADoNiS Datasheet

MACS30 vs. N

Isotopic mass chain
Show/hide mass chain

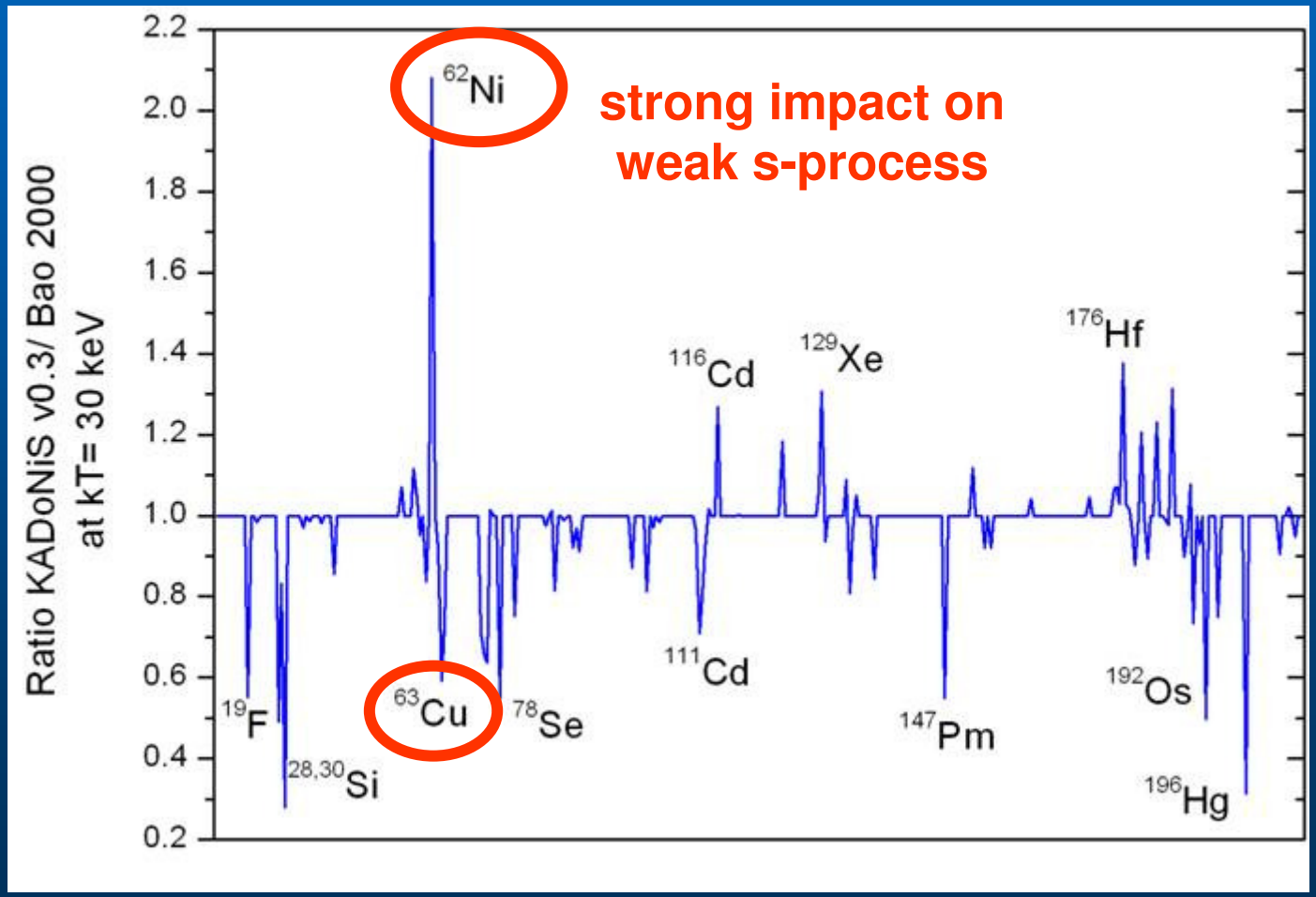


Quick links to other isotopes

^{74}Rb 64.90 ms β$^+$	^{75}Rb 19.00 s β$^+$	^{76}Rb 36.50 s β$^+$	^{77}Rb 3.77 m β$^+$	^{78}Rb 17.66 m β$^+$	^{79}Rb 22.90 m β$^+$	^{80}Rb 33.40 s β$^+$
^{73}Kr 27.30 s β$^+$	^{74}Kr 11.50 m β$^+$	^{75}Kr 4.29 m β$^+$	^{76}Kr 14.80 h β$^+$	^{77}Kr 1.24 h β$^+$	^{78}Kr 0.35	^{79}Kr 1.46 d β$^+$
^{72}Br 1.31 m β$^+$	^{73}Br 3.40 m β$^+$	^{74}Br 25.40 m β$^+$	^{75}Br 1.61 h β$^+$	^{76}Br 16.20 h β$^+$	^{77}Br 2.38 d β$^+$	^{78}Br 6.46 m β$^+$
^{71}Se 4.74 m β$^+$	^{72}Se 8.40 d β$^+$	^{73}Se 7.15 h β$^+$	^{74}Se 0.89	^{75}Se 119.78 d β$^+$	^{76}Se 9.37	^{77}Se 7.63
^{70}As 52.60 m β$^+$	^{71}As 2.72 d β$^+$	^{72}As 1.08 d β$^+$	^{73}As 80.30 d β$^+$	^{74}As 17.77 d β$^+$	^{75}As 100	^{76}As 1.09 d β$^-$
^{69}Ge 1.63 d β$^+$	^{70}Ge 20.37	^{71}Ge 11.43 d β$^+$	^{72}Ge 27.31	^{73}Ge 7.76	^{74}Ge 36.73	^{75}Ge 1.38 h β$^-$
^{68}Ga 1.13 h β$^+$	^{69}Ga 60.108	^{70}Ga 21.14 m β$^-$	^{71}Ga 39.892	^{72}Ga 14.10 h β$^-$	^{73}Ga 4.86 h β$^-$	^{74}Ga 8.12 m β$^-$

Style: (S, M, L or XL) Refresh

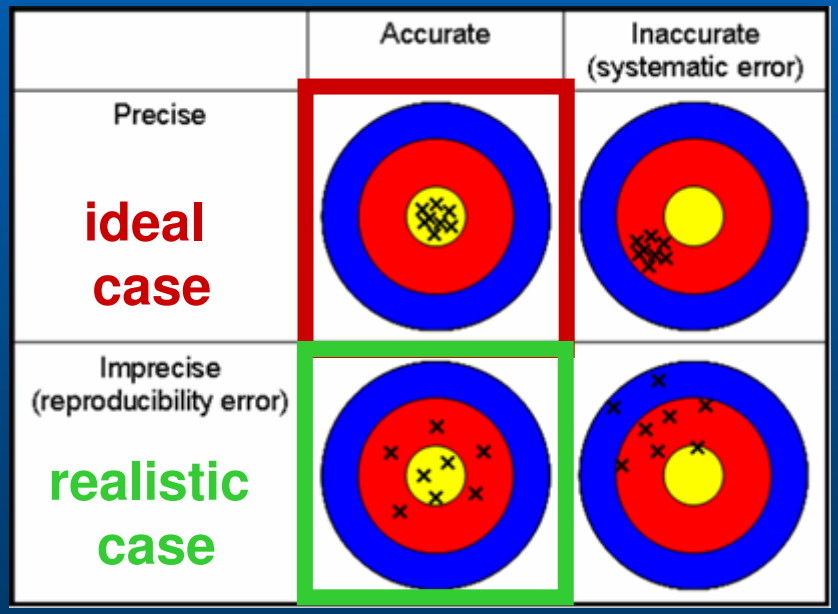
Comparison Bao 2000- KADoNiS v0.3



Why does astrophysics need reliable cross sections?

⇨ reduce uncertainty from nuclear physics input to reveal model-dependent uncertainties

reliable=
accurate
&
precise



high precision: e.g. by recent TOF measurements (1-3% reasonable)
high accuracy: **verify results** with independent methods, e.g. activation technique (eliminates systematic errors)

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