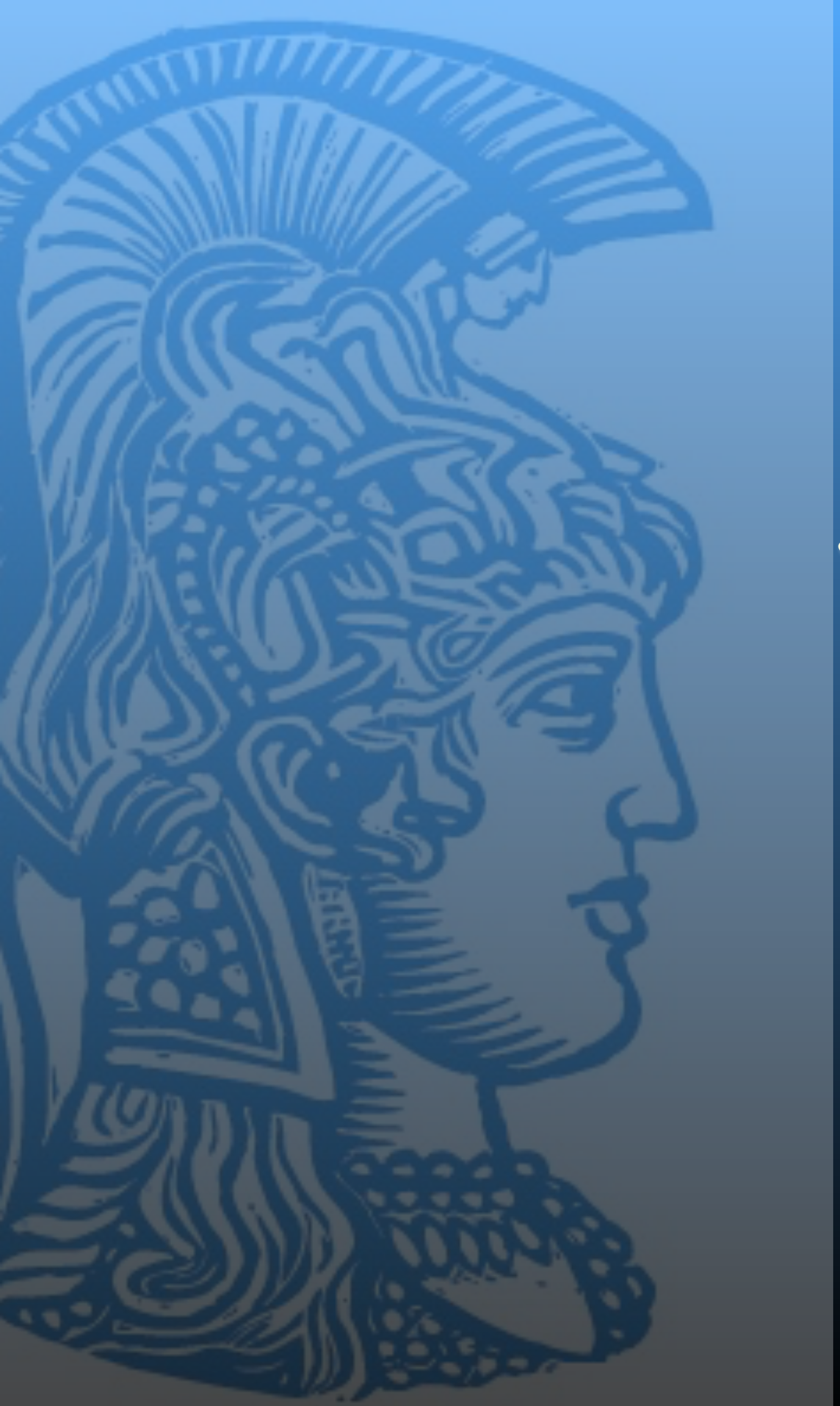

A web-based database for nuclear EM moments: status and perspectives

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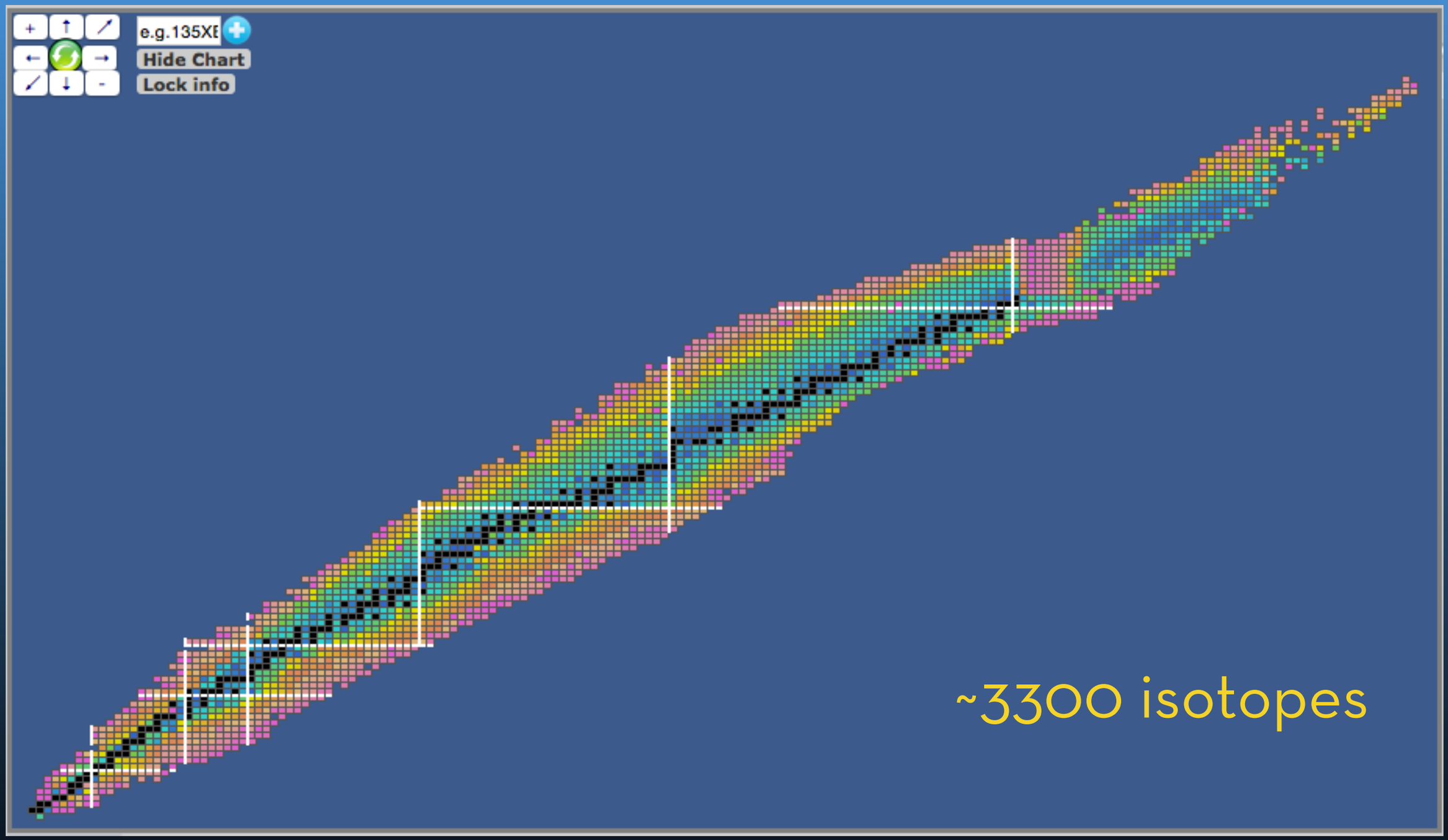
Outline

- Introduction
- The nuclear EM moments DB
- Layout and technical aspects
- Serve - Integrate - Upscale
- The vision for the future

The Nuclear Chart



RIB: The Ongoing Revolution

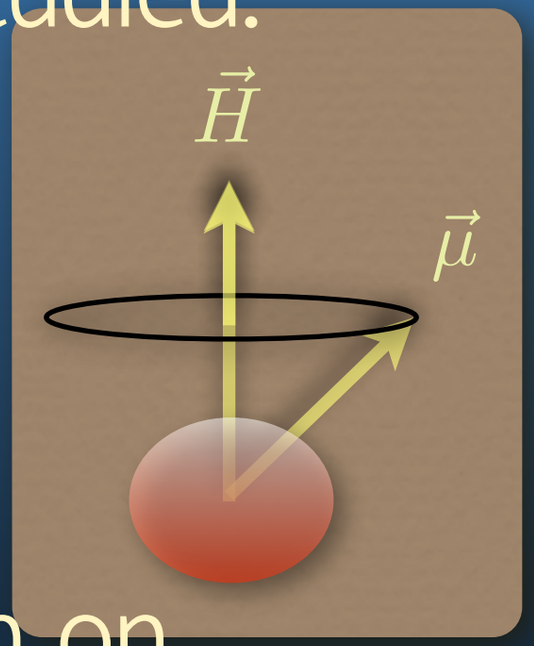
- Extensive use during the last 10-15 years
- Opened broad new horizons
- New limits and magic numbers
- Newly observed isotopes
- New phenomena on shell closures, interactions, shapes, ...

What Does This Mean?

LOTS
of
DATA

Focus On Moments

- How do electromagnetic moments fit in this new playground?
- Two types of moments are typically studied:
  - Magnetic Dipole Moment, μ
  - Electric Quadrupole Moment, Q
- EM moments offer unique information on nuclear structure



Nuclear μ & Q Data

Lots of work on tabulating such data:

just a few

- J. Mack, Rev. Mod. Phys. 22, 64 (1950)
- G. Fuller, J. Phys. Chem. Ref. Data 5, 836 (1976)
- P. Raghavan, At. Data Nucl. Data Tables 42, 189 (1989)
- N.J. Stone, At. Data Nucl. Data Tables 90, 75 (2005)
- P. Pyykkö, Mol. Phys. 106, 1965 (2008)
- N.J. Stone, INDC(NDS) 0594 (2011)
- N.J. Stone, INDC(NDS) 0658 (2014)

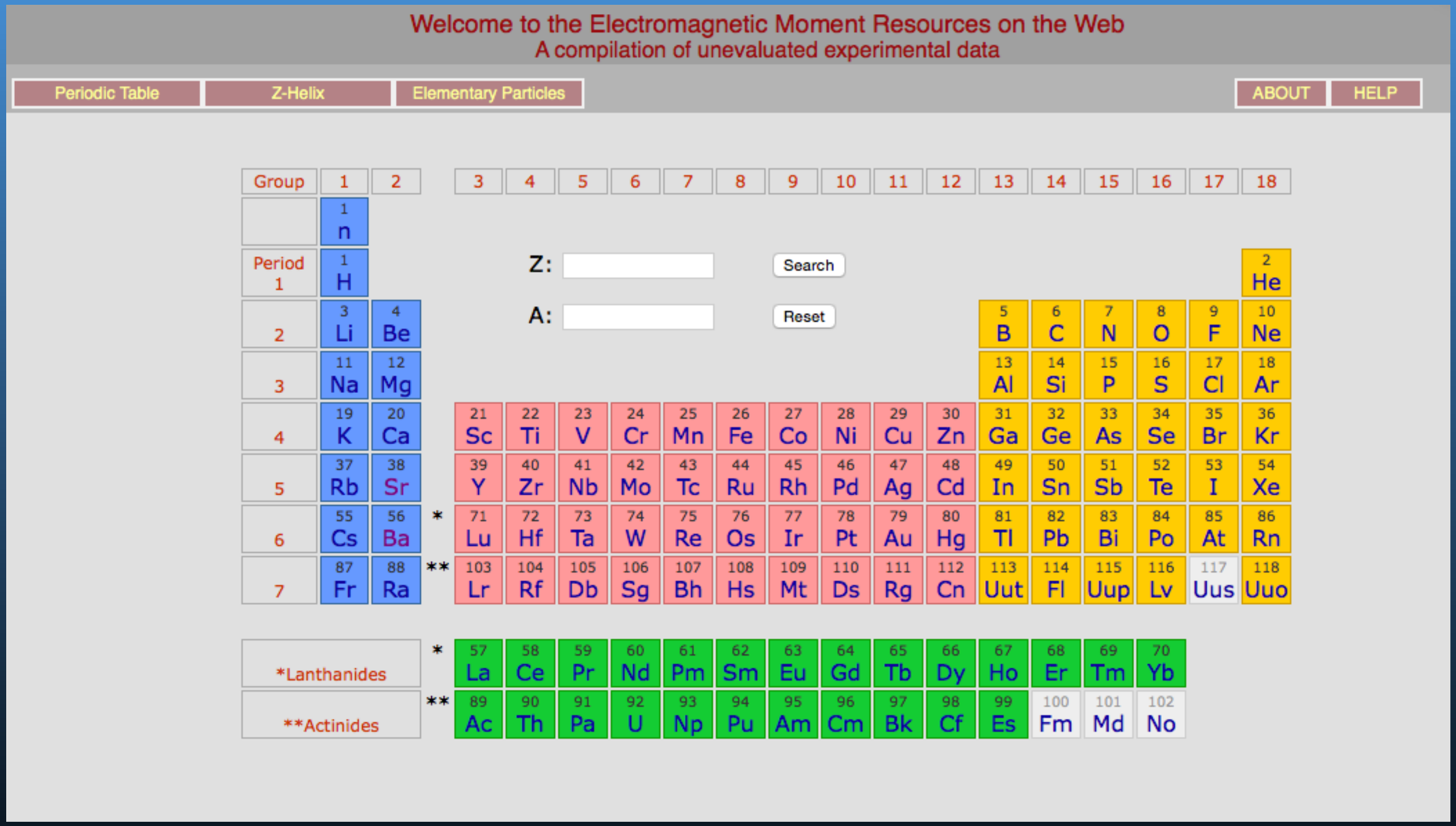
Do We Need A new Database?

YES

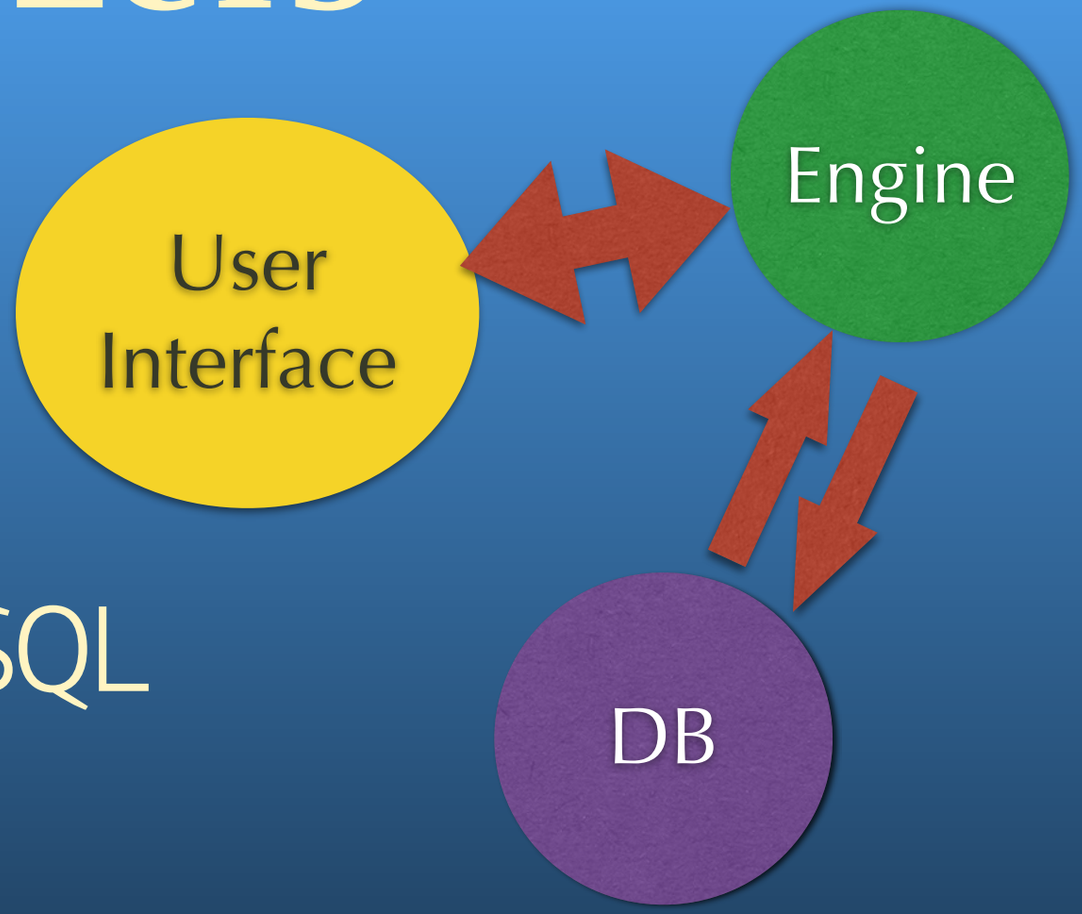
Because We Now Can:

- Take advantage of the WWW
- Build on top of existing print compilations
- Point researchers directly to digital sources
- Invest on synergies with experts (IT, Phys)
- Provide data systematics and visual info

http://magneticmoments.info

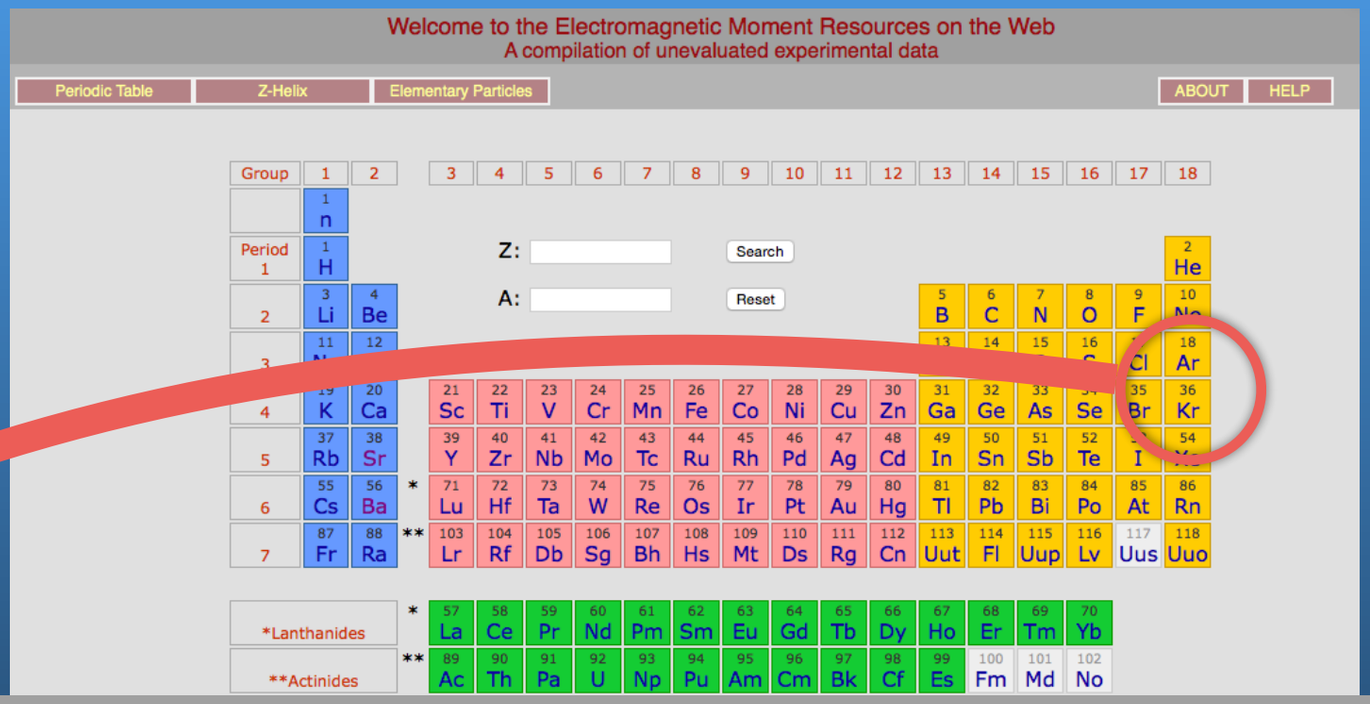


Tech Aspects



- User Interface is HTML
- Data are tabulated in MySQL
- Engine is built in PHP
- Small fingerprint; Comfy interaction; Clear Info
- Easy upgrades, easy expansion

Example: Kr isotopes



Welcome to the Electromagnetic Moment Resources on the Web
A compilation of unevaluated experimental data
Periodic Table
Z-Helix
Elementary Particles
ABOUT
HELP

Krypton (Z=36)

^{75}Kr ^{76}Kr ^{77}Kr ^{78}Kr ^{79}Kr ^{80}Kr ^{81}Kr ^{82}Kr ^{83}Kr ^{84}Kr ^{85}Kr ^{86}Kr ^{87}Kr ^{89}Kr ^{91}Kr ^{93}Kr ^{95}Kr

Isotope	Energy [keV]	$t_{1/2}$	Spin/Parity	μ [nm]	Q [b]	Ref. Std	Method	NSR keyword	doi
^{80}Kr	617.	8.7 ps	2^+	+0.76(10)			TF	2001Me20	10.1103/PhysRevC.64.024314
	1257.	1.0 ps	4^+	+1.8(6)			TF	2001Me20	10.1103/PhysRevC.64.024314
	1436.	7.6 ps	2^+	+1.3(7)			TF	2001Me20	10.1103/PhysRevC.64.024314

Transient Field integral perturbed angular correlation

Example: A=9 Isobars

Welcome to the Electromagnetic Moment Resources on the Web
A compilation of unevaluated experimental data

Periodic Table | Z-Helix | Elementary Particles | ABOUT | HELP

Lithium (Z=3)

^{6}Li | ^{7}Li | ^{8}Li | ^{9}Li | ^{11}Li

Isotope	Energy [keV]	$t_{1/2}$	Spin/Parity	μ [nm]	Q [b]	Ref. Std	Method	NSR keyword	doi
^{9}Li	0.	178 ms	3/2$^-$	3.4391(16)		[^{1}H]	β-NMR	1983Co11	10.1103/PhysRevC.28.862
				3.434(5)		[^{8}Li]	CFBLS/β-NMR	1988Ar17	
					0.0253(9)	[^{7}Li]	CFBLS/β-NMR	1988Ar17	
					0.036(7) st	[^{7}Li]	β-NMR	1983Co11	10.1103/PhysRevC.28.862

Beryllium (Z=4)

^{7}Be | ^{9}Be | ^{11}Be

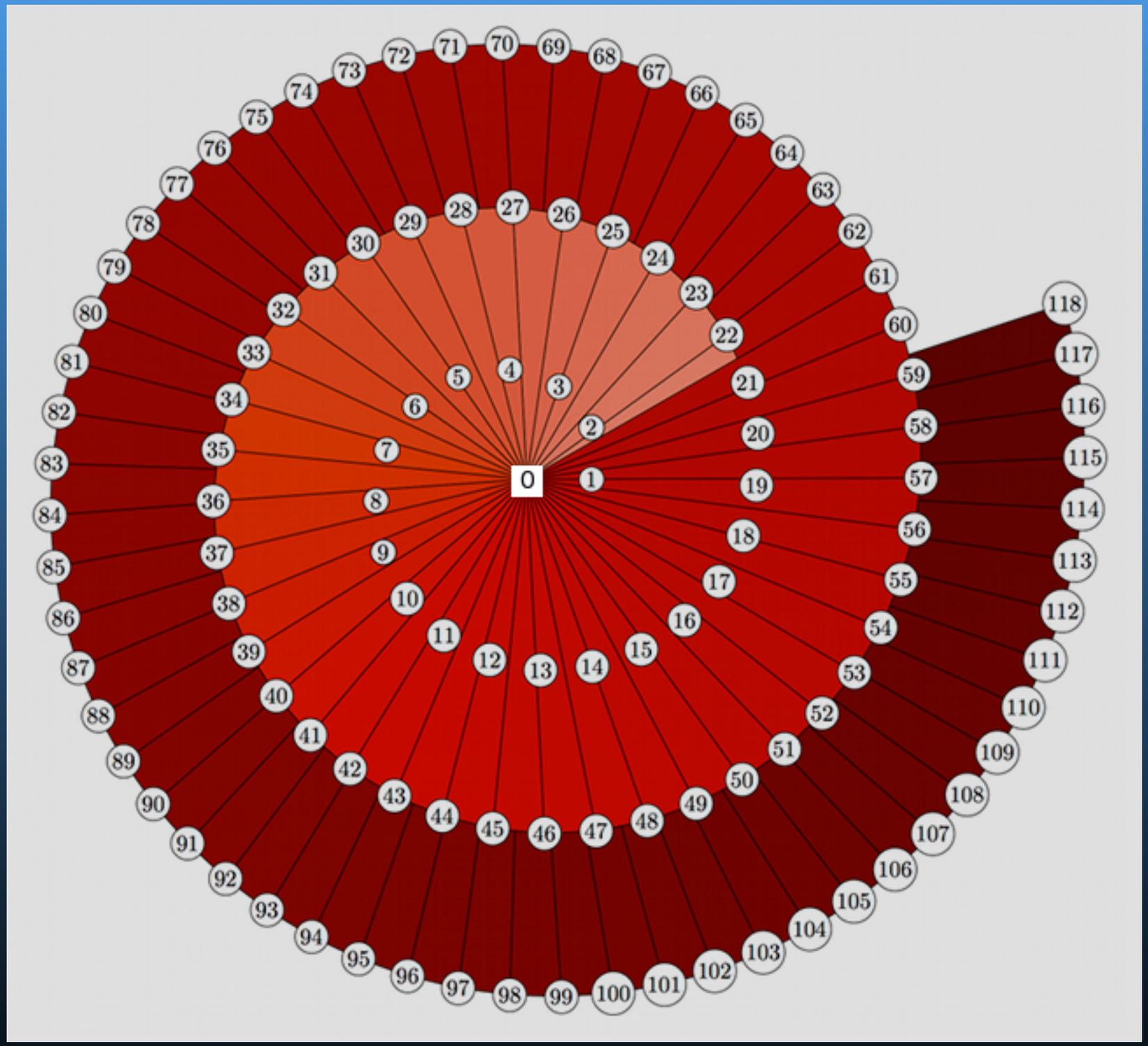
Isotope	Energy [keV]	$t_{1/2}$	Spin/Parity	μ [nm]	Q [b]	Ref. Std	Method	NSR keyword	doi
^{9}Be	0.	stable	3/2$^-$	-1.177432(3) d			R	1983It03	10.1103/PhysRevB.27.1906
				-1.1778(9)			N, OP/RD	1976We17	10.1016/0375-9601(76)90722-2
				-1.17749(2)		[^{1}H]	N	1949Di25 1951Al11	10.1103/PhysRev.75.1769 10.1103/PhysRev.82.105
					+0.0529(4)		R	1991Su05	10.1016/0009-2614(91)90181-8
					+0.053(3) st		AB	1967Bl09	10.1103/PhysRev.153.164

Carbon (Z=6)

^{9}C | ^{11}C | ^{12}C | ^{13}C | ^{14}C | ^{15}C | ^{17}C

Isotope	Energy [keV]	$t_{1/2}$	Spin/Parity	μ [nm]	Q [b]	Ref. Std	Method	NSR keyword	doi
^{9}C	0.	126 ms	3/2$^-$	1.3914(5)			β-NMR	1995Ma48	10.1016/0375-9474(95)00115-H
				1.396(3)			β-NMR	1998Hu08	10.1103/PhysRevC.57.R2790

The Z-Helix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Present Status

- Over 1100 levels w/ measured moments
- Some 5300 individual measurements
- Elementary particle data (from PDG site)
- DOI info (a click away). Checked w/ NSR; some corrected; ≈200 new found (<— NSR interested?)
- Real power: Bi-Monthly updates (scanning ~30 major journals/preprints/RSS etc)

SERVE-INTEGRATE-UPSCALE

- Isotope / Level energy, spin, parity, halflife
- Magnetic dipole moment
- Electric Quadrupole moment
- Experimental technique / reference nucleus
- Nuclear Structure Reference (NSR) keyword
- DOI - link to original publication

Serve-Integrate-Upscale

- DB is stand-alone. However:
  - PHP enables easy integration with all major databases
  - IAEA LiveChart is just a step away

Serve-Integrate-Upscale

- Provide graphical view of systematics
- Enrich secondary information offered

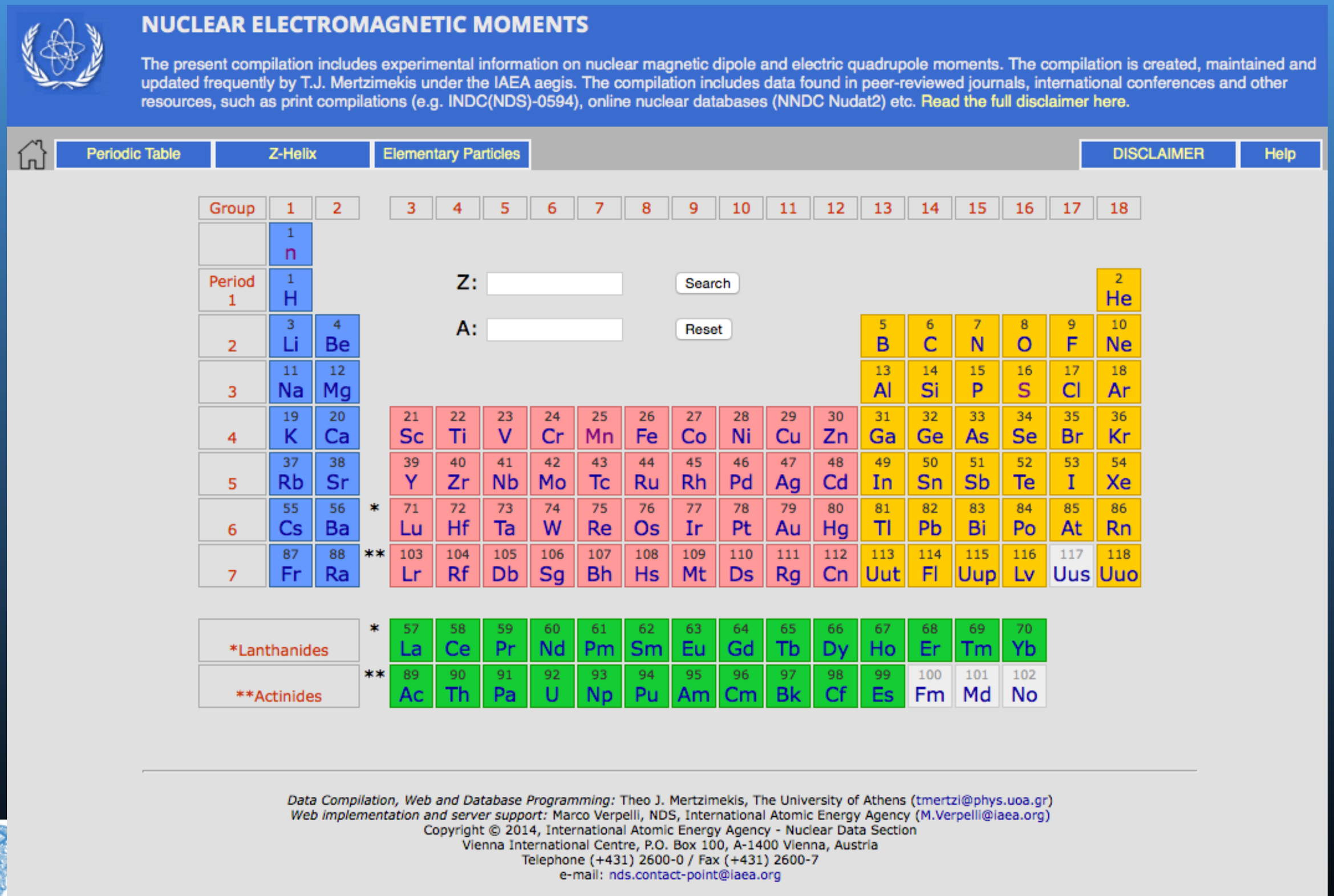
  e.g. on experimental techniques

- Start an online forum for colleagues

  DB blog: http://magneticmoments.info/wp

- Go mobile

Near-Future Plans



Vision For The Future

- UPDATE ! UPDATE ! UPDATE!
- Work closely with the IAEA NDS Group and the Community
- Collaborate with experts on moments evaluation
- Getting DB ready for accommodating high flux of data when times comes (FAIR, FRIB, SPIRAL2 etc)

Thanks To:

- IAEA Nuclear Data Section
- University of Athens NuSTRAP Group
- Reload Entertainment Ltd