Core excitations on semi-magic Ni and Sn nuclei

Kamila Sieja[1]

Institut Pluridisciplinaire Hubert Curien

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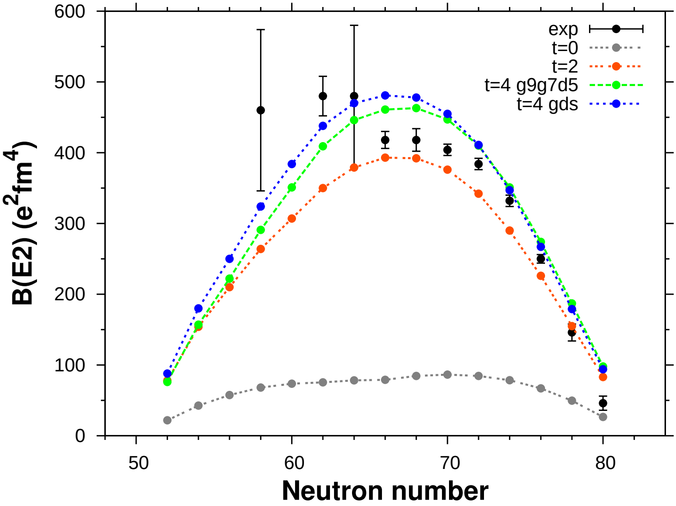
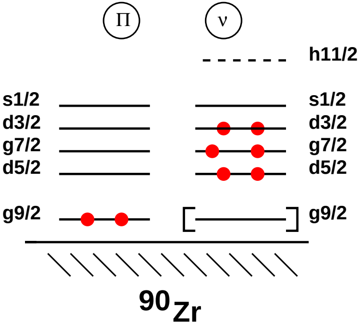
[1] Strasbourg-Madrid SM collaboration

Core excitations in tin isotopes: reminder



A. Banu et al., PRC72, 06135(R) 2005.

Tin isotopes: reminder

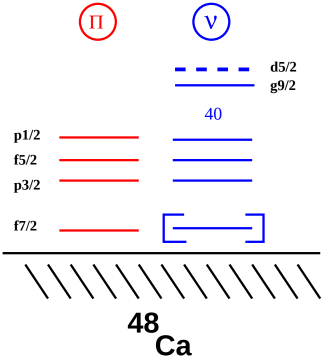


☺ no center of mass problem

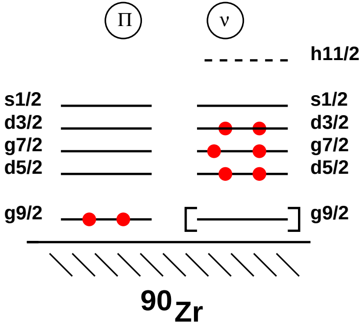
☺ full space diagonalization possible

☹ not applicable for light tins

Nickels vs Tins

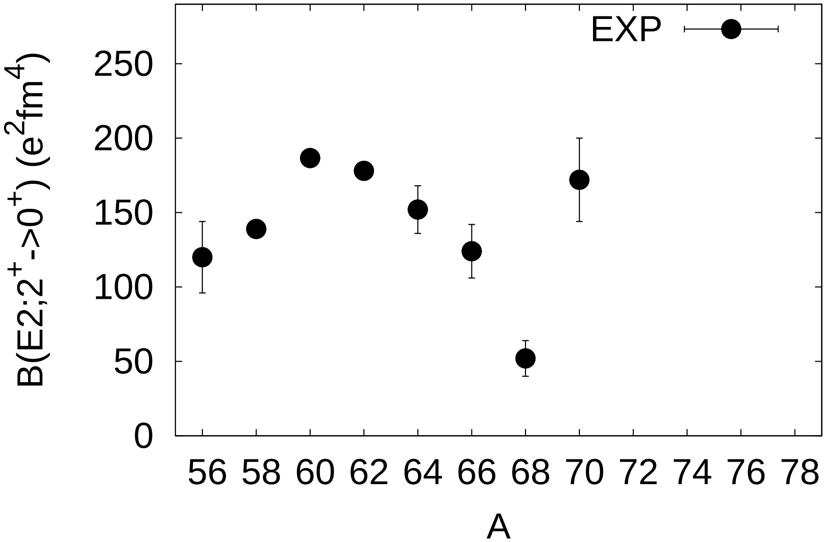


^{56}Ni-^{78}Ni

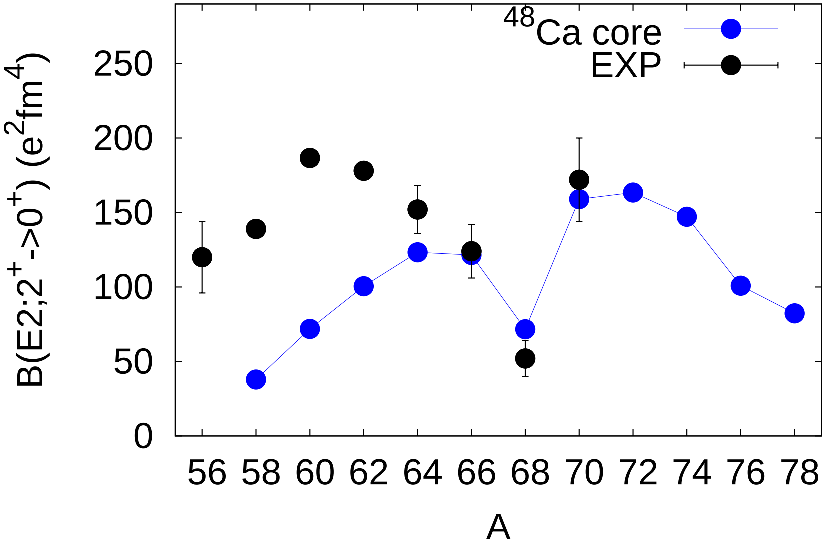


^{100}Sn-^{132}Sn

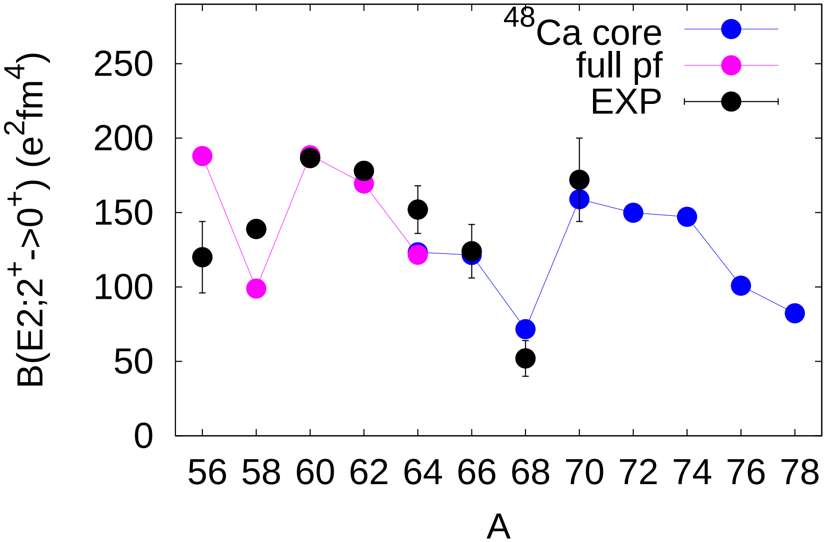
B(E2)'s in nickel isotopes



B(E2)'s in nickel isotopes

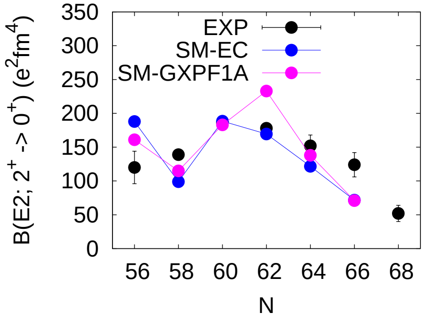


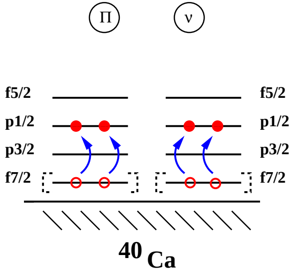
B(E2)'s in nickel isotopes



Core excitations on semi-magic nickels

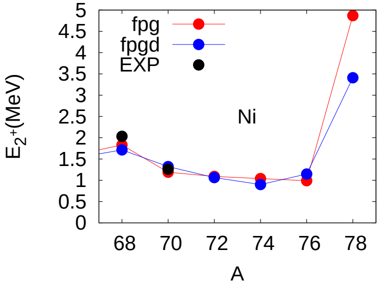
☞Correlations in light nickel isotopes are well described within the pf-shell

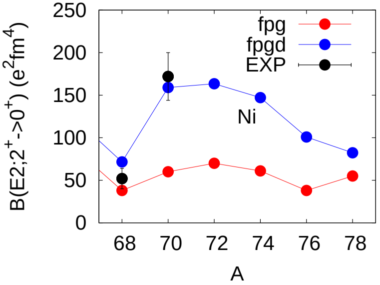




☞We should be good with gds shell for neutrons and protons for a proper description of the vicinity of ^{100}Sn

Collectivity in heavy nickels

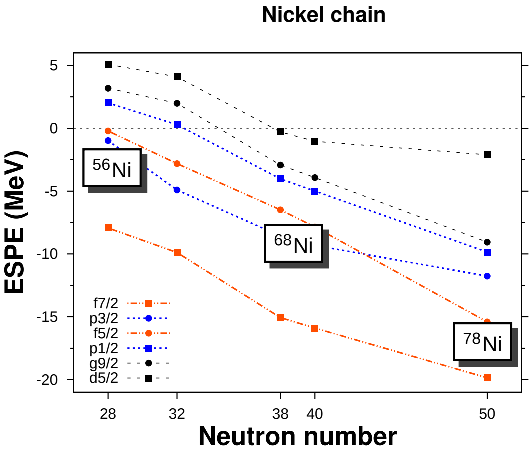




☞ $\nu d_{5/2}$ orbital necessary to account for B(E2) of heavier nickels

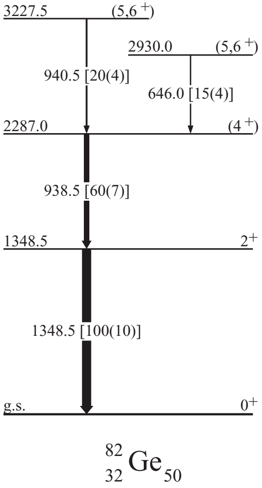
☞ Developement of deformation in nuclei below ^{68}Ni $\rightarrow$ new island of inversion at N=40 (S. Lenzi talk)

Doubly magic? Ni56, Ni68, Ni78

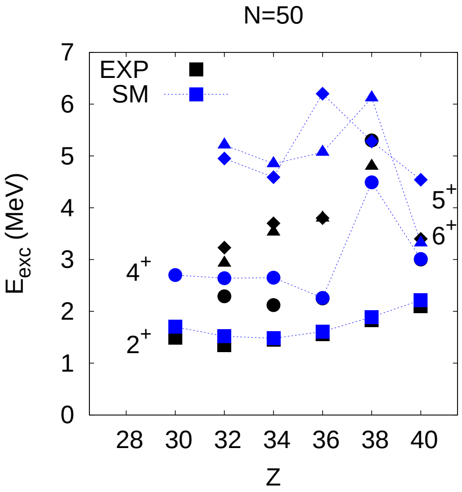


- ^{56}Ni: well doubly-magic; Z,N=28 gap 6.5MeV
- ^{68}Ni: mixture of magic and superfluid (O. Sorlin et al, 2002)
- reduction of the proton gap between ^{68}Ni and ^{78}Ni (J.M. Daugas, PRC2010, KS and FN, to be published)

Stability of shell closures in ^{78}Ni



T. Rzaca-Urban et al., PRC 76 (2007) 027302

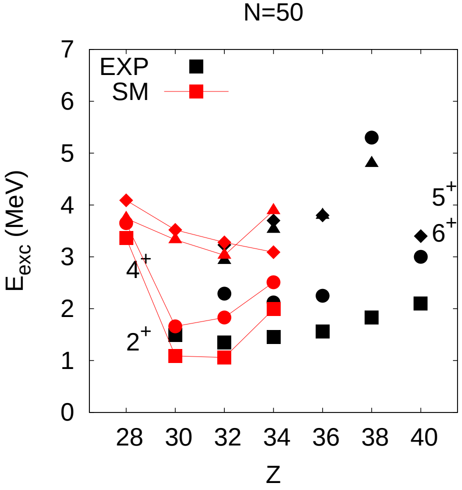


SM: πrg, Lisetskiy et al.

N=50 isotones

^{82}Ge

J^π	$f_{7/2}$	p	$f_{5/2}$	$g_{9/2}$	$d_{5/2}$
0^+	7.65	0.37	3.97	9.48	0.48
2^+	7.80	0.30	3.90	9.46	0.57
5^+	7.64	0.49	3.87	8.44	1.57
6^+	7.62	0.48	3.90	8.51	1.50



SM: $\pi pf, \nu fpgd$, LNPS

Summary & Perspectives

- Core excitations crucial for the B(E2)'s in nickels.
- Weaknening of the proton gap between ^{68}Ni and ^{78}Ni from 5.7MeV to 5.0MeV.
- ^{78}Ni is supposed to be a doubly magic nucleus with proton gap 5.0MeV and neutron one of 4.6MeV.
- Light tin isotopes (100-110) should be well described in the $\pi\nu$ gds model space
- Role of the neutron core excitations in light Sn isotopes -in progress

Thanks to:
E. Caurier, F. Nowacki, A. Poves
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