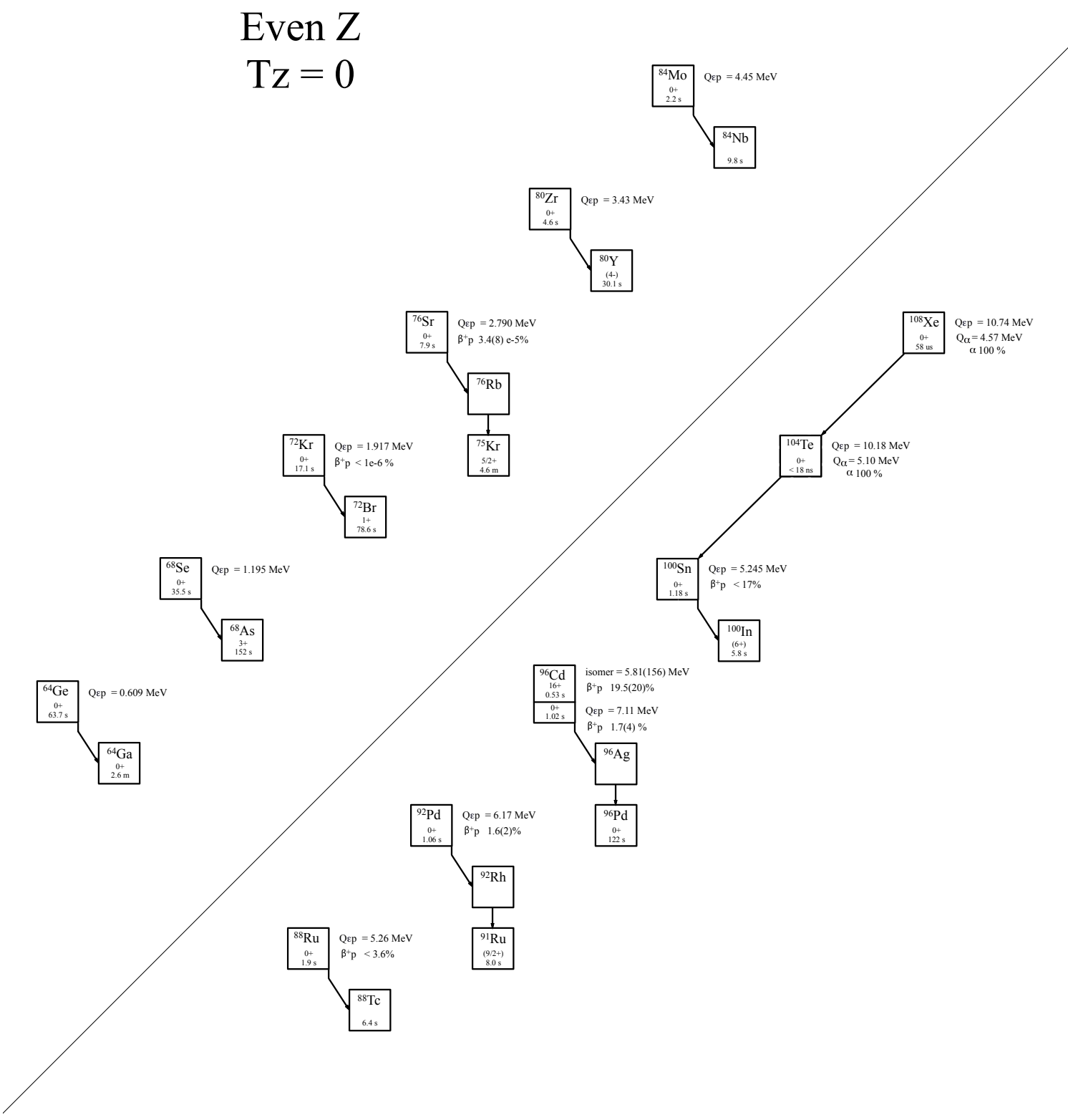

Fig. 1: Known experimental values for heavy particle emission of the even-Z $T_z = 0$ nuclei.

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Table 1
Observed and predicted β-delayed particle emission from the even-Z, T_z = 0 nuclei. Unless otherwise stated, all Q-values are taken from [2021Wa16] or deduced from values therein.

Nuclide	Ex	J^π	$T_{1/2}$	Q_ε	$Q_{\varepsilon p}$	$BR_{\beta p}$	$Q_{\varepsilon 2p}$	$Q_{\varepsilon\alpha}$	Experimental
^{64}Ge		0^+	63.7(25) s	4.517(4)	0.609(4)		-6.107(4)	1.604(4)	[**1974Ro16**]
^{68}Se		0^+	35.5(7) s	4.7051(19)	1.195(4)		-5.044(1)	2.218(2)	[**1994Ba50**]
^{72}Kr		0^+	17.1(2) s	5.121(8)	1.917(8)	$<1\times10^{-6}$%	-4.185(8)	2.529(8)	[**2003Pi03, 2015Br17**]
^{76}Sr		0^+	7.89(7) s	6.230(30)	2.790(40)	$3.4(8)\times10^{-5}$%	-3.540(31)	2.387(30)	[**2004De24**, 2013Pe13]
^{80}Zr		0^+	4.6(6) s	6.39(30)#	3.43(30)#		-2.40(30)#	3.29(30)#	[**2003Au02**]
^{84}Mo		0^+	2.2(2) s	7.02(30)#	4.45(30)#		-0.68(30)#	4.55(30)#	[**2009St04**]
^{88}Ru		0^+	1.9(5) s	7.33(30)#	5.26(30)#	<3.6%	0.22(30)#	4.43(30)#	[**2019Pa16**, 2001Ki13]
^{92}Pd		0^+	1.06(3) s	8.22(35)	6.17(35)	1.6(2)%	1.37(35)	4.47(35)	[**2019Pa16**]
^{96}Cd		0^+	1.02(6) s	8.94(40)#	7.11(41)#	1.7(4)%	2.76(41)#	5.00(41)#	[**2019Pa16**, 2017Da07, 2012Lo08]
^{96m}Cd	5.81(156)	16^+	0.53(3) s	14.7(16)#	12.9(16)#	19.5(29)%	8.6(16)#	10.8(16)	[**2019Pa16**, 2017Da07]
^{100}Sn		0^+	1.18(8) s	7.03(24)	5.245(7)	<17%	1.34(24)	4.94(26)	[**2019Lu08, 1997Su06**, 2012Hi07, 2012Lo08, 2008Ba53]
^{104}Te		0^+	<18 ns	9.67(33)#	10.18(33)#		6.49(32)	12.12(32)	[**2018Au04**, 2019Xi06]
^{108}Xe		0^+	58^{+106}_{-23} μs		10.74(39)#		9.27(38)	14.25(39)#	[**2018Au04**, 2019Xi06, 2008Ko04]

Table 2
Particle emission from the even-Z, T_z = 0 nuclei. Unless otherwise stated, all Q-values and separation energies are taken from [2021Wa16] or deduced from values therein.

Nuclide	S_p	S_{2p}	Q_α	BR_α	Experimental
^{64}Ge	5.057(4)	7.725(4)	-2.566(4)	—	
^{68}Se	4.8912(7)	7.1604(25)	-2.299(4)	—	
^{72}Kr	4.727(10)	6.589(8)	-2.176(8)	—	
^{76}Sr	4.320(30)	6.490(30)	-2.91(71)	—	
^{80}Zr	4.25(31)#	6.16(30)#	-2.94(30)#	—	
^{84}Mo	3.85(34)#	5.13(30)#	-1.84(42)#	—	
^{88}Ru	3.94(30)#	4.91(30)#	-2.59(42)#	—	
^{92}Pd	3.50(46)#	4.47(35)	-2.86(46)#	—	
^{96}Cd	2.96(57)#	4.05(41)#	-3.22(54)#	—	
^{96m}Cd	-2.85(16)#	-1.76(16)#	1.88(16)#		
^{100}Sn	3.06(38)#	4.09(25)	-4.00(48)#	—	
^{104}Te	0.25(44)#	-0.73(33)	5.10(21)	100%	[**2019Xi06, 2018Au04**]
^{108}Xe	0.49(48)#	-1.01(39)#	4.57(21)	100%	[**2018Au04**, 2019Xi06, 2008Ko04]

Table 3
β-p Emission from ^{96m}Cd*, $T_{1/2}$ = 0.53(3) s, $BR_{\beta p}$ = 19.5(29)%.

E_p	I_p(rel)%	I_p(abs)%	$E_{emitter}$ (^{96}Ag)	$E_{daughter}$(^{95}Pd)	coincident γ-rays
**	22(14)	2.1(14)		4.751	0.130, 0.691, 0.821, 1.375
**	72(42)	7.0(42)		4.071	0.130, 0.691, 0.821, 1.375
**	100(62)	9.8(62)		2.696	0.130, 0.691, 0.821

* All values taken from [2019Pa16].
** Unresolved multiplet (Ep $\approx$ 1.5-6 MeV) - see Fig 8 in ref. [2019Pa16].

Table 4
direct α emission from ^{104}Te*, $J^\pi = 0^+$, $T_{1/2}$ =<18 ns, BR_α =100%.

E_α(c.m.)	E_α(lab)	I_α(abs)	J^π_f	$E_{daughter}$(^{100}Sn)	coincident γ-rays	R_0 (fm)	HF
5.096(20)	4.90(20)	100%	0^+	0.0	—	$1.890^{+.058}_{-.035}$	>0.41

* All values from [2018Au04].

Table 5
direct α emission from ^{108}Xe*, $J^{\pi} = 0^{+}$, $T_{1/2} = 58^{+106}_{-23}$ μs, BR_{α} =100%.

E_{α}(c.m.)	E_{α}(lab)	I_{α}(abs)	J^{π}_{f}	$E_{daughter}$(^{104}Te)	coincident γ-rays	R_0 (fm)	HF
4.569(20)	4.40(20)	100%	0^{+}	0.0	—	$2.046^{+0.060}_{-0.036}$	0.75(30)

* All values from [2018Au04].

References used in the Tables

[1] **1974Ro16** R. G. H. Robertson, S. M. Austin, Phys.Rev. C**9**, 1801 (1974). https://doi.org/10.1103/PhysRevC.9.1801

[2] **1994Ba50** P. Baumann, M. Bounajma, A. Huck, G. Klotz, A. Knipper, G. Walter, G. Marguier, C. Richard-Serre, H. Ravn, E. Hagebo, P. Hoff, K. Steffensen, Phys. Rev. C**50**, 1180 (1994). https://doi.org/10.1103/PhysRevC.50.1180

[3] **1997Su06** K. Summerer, R. Schneider, T. Faestermann, J. Friese, H. Geissel, R. Gernhauser, H. Gilg, F. Heine, J. Homolka, P. Kienle, H. J. Korner, G. Munzenberg, J. Reinhold, K. Zeitelhack, Nucl. Phys. A**616**, 341c (1997). https://doi.org/10.1016/S0375-9474(97)00106-1

[4] **2001Ki13** P. Kienle, T. Faestermann, J. Friese, H. -J. Korner, M. Munch, R. Schneider, A. Stolz, E. Wefers, H. Geissel, G. Munzenberg, C. Schlegel, K. Summerer, H. Weick, M. Hellstrom, P. Thirolf, Prog. Part. Nucl. Phys. **46**, 73 (2001). https://doi.org/10.1016/S0146-6410(01)00109-0

[5] **2003Au02** G. Audi, O. Bersillon, J. Blachot, A. H. Wapstra, Nucl. Phys. A**729**, 3 (2003). oi: 10.1016/j.nuclphysa.2003.11.001

[6] **2003Pi03** I. Piqueras, M. J. G. Borge, Ph. Dessagne, J. Giovinazzo, A. Huck, A. Jokinen, A. Knipper, C. Longour, G. Marguier, M. Ramdhane, V. Rauch, O. Tengblad, G. Walter, Ch. Miehe, and the ISOLDE Collaboration, Eur. Phys. J. A —bf16, 313 (2003). https://doi.org/10.1140/epja/i2002-10105-x

[7] **2004De24** Ph. Dessagne, M. J. G. Borge, J. Giovinazzo, A. Huck, A. Jokinen, A. Knipper, C. Longour, G. Marguier, M. Ramdhane, V. Rauch, O. Tengblad, G. Walter, Ch. Miehe, and the ISOLDE Collaboration, Eur. Phys. J. A **20**, 405 (2004). https://doi.org/10.1140/epja/i2003-10171-6

[8] **2008Ba53** D. Bazin, F. Montes, A. Becerril, G. Lorusso, A. Amthor, T. Baumann, H. Crawford, A. Estrade, A. Gade, T. Ginter, C. J. Guess, M. Hausmann, G. W. Hitt, P. Mantica, M. Matos, R. Meharchand, K. Minamisono, G. Perdikakis, J. Pereira, J. Pinter, M. Portillo, H. Schatz, K. Smith, J. Stoker, A. Stolz, R. G. T. Zegers, Phys. Rev. Lett. **101**, 252501 (2008). https://doi.org/10.1103/PhysRevLett.101.252501

[9] **2008Ko04** A. Korgul, K. P. Rykaczewski, C. J. Gross, R. K. Grzywacz, S. N. Liddick, C. Mazzocchi, J. C. Batchelder, C. R. Bingham, I. G. Darby, C. Goodin, J. H. Hamilton, J. K. Hwang, S. V. Ilyushkin, W. Krolas, J. A. Winger, Phys. Rev. C **77**, 034301 (2008). https://doi.org/10.1103/PhysRevC.77.034301

[10] **2009St04** J. B. Stoker, P. F. Mantica, D. Bazin, A. Becerril, J. S. Berryman, H. L. Crawford, A. Estrade, C. J. Guess, G. W. Hitt, G. Lorusso, M. Matos, K. Minamisono, F. Montes, J. Pereira, G. Perdikakis, H. Schatz, K. Smith, R. G. T. Zegers, Phys. Rev. C **79**, 015803 (2009). https://doi.org/10.1103/PhysRevC.79.015803

[11] **2012Hi07** C. B. Hinke, M. Bohmer, P. Boutachkov, T. Faestermann, H. Geissel, J. Gerl, R. Gernhauser, M. Gorska, A. Gottardo, H. Grawe, J. L. Grebosz, R. Krucken, N. Kurz, Z. Liu, L. Maier, F. Nowacki, S. Pietri, Zs. Podolyak, K. Sieja, K. Steiger, K. Straub, H. Weick, H. -J. Wollersheim, P. J. Woods, N. Al-Dahan, N. Alkhomashi, A. Atac, A. Blazhev, N. F. Braun, I. T. Celikovic, T. Davinson, I. Dillmann, C. Domingo-Pardo, P. C. Doornenbal, G. de France, G. F. Farrelly, F. Farinon, N. Goel, T. C. Habermann, R. Hoischen, R. Janik, M. Karny, A. Kaskas, I. M. Kojouharov, Th. Kroll, Y. Litvinov, S. Myalski, F. Nebel, S. Nishimura, C. Nociforo, J. Nyberg, A. R. Parikh, A. Prochazka, P. H. Regan, C. Rigollet, H. Schaffner, C. Scheidenberger, S. Schwertel, P. -A. Soderstrom, S. J. Steer, A. Stolz, P. Strmen, Nature(London) —bf486, 341 (2012). https://doi.org/10.1038/nature11116

[12] **2012Lo08** G. Lorusso, A. Becerril, A. Amthor, T. Baumann, D. Bazin, J. S. Berryman, B. A. Brown, R. H. Cyburt, H. L. Crawford, A. Estrade, A. Gade, T. Ginter, C. J. Guess, M. Hausmann, G. W. Hitt, P. F. Mantica, M. Matos, R. Meharchand, K. Minamisono, F. Montes, G. Perdikakis, J. Pereira, M. Portillo, H. Schatz, K. Smith, J. Stoker, A. Stolz, R. G. T. Zegers, Phys. Rev. C **86**, 014313 (2012).

[13] **2013Pe13** A. B. Perez-Cerdan, B. Rubio, W. Gelletly, A. Algora, J. Agramunt, E. Nacher, J. L. Tain, P. Sarriguren, L. M. Fraile, M. J. G. Borge, L. Caballero, Ph. Dessagne, A. Jungclaus, G. Heitz, F. Marechal, E. Poirier, M. D. Salsac, O. Tengblad, Phys. Rev. C **88**, 014324 (2013). https://doi.org/10.1103/PhysRevC.88.014324

[14] **2015Br17** J. A. Briz, E. Nacher, M. J. G. Borge, A. Algora, B. Rubio, Ph. Dessagne, A. Maira, D. Cano-Ott, S. Courtin, D. Escrig, L. M. Fraile, W. Gelletly, A. Jungclaus, G. Le Scornet, F. Marechal, Ch. Miehe, E. Poirier, A. Poves, P. Sarriguren, J. L. Tain, O. Tengblad, Phys. Rev. C **92**, 054326 (2015). https://doi.org/10.1103/PhysRevC.92.054326

[15] **2017Da07** P. J. Davies, H. Grawe, K. Moschner, A. Blazhev, R. Wadsworth, P. Boutachkov, F. Ameil, A. Yagi, H. Baba, T. Back, M. Dewald, P. Doornenbal, T. Faestermann, A. Gengelbach, J. Gerl, R. Gernhaeuser, S. Go, M. Gorska, E. Gregor, T. Isobe, D. G. Jenkins, H. Hotaka, J. Jolie, I. Kojouharov, N. Kurz, M. Lewitowicz, G. Lorusso, L. Maier, E. Merchan, F. Naqvi, H. Nishibata, D. Nishimura, S. Nishimura, F. Nowacki, N. Pietralla, H. Schaffner, P. -A. Soderstrom, H. S. Jung, K. Steiger, T. Sumikama, J. Taprogge, P. Thole, N. Warr, H. Watanabe, V. Werner, Z. Y. Xu, K. Yoshinaga, Y. Zhu, Phys. Lett. B **767**, 474 (2017). https://doi.org/10.1016/j.physletb.2017.02.013

[16] **2018Au04** K. Auranen, D. Seweryniak, M. Albers, A. D. Ayangeakaa, S. Bottoni, M. P. Carpenter, C. J. Chiara, P. Copp, H. M. David, D. T. Doherty, J. Harker, C. R. Hoffman, R. V. F. Janssens, T. L. Khoo, S. A. Kuvin, T. Lauritsen, G. Lotay, A. M. Rogers, J. Sethi, C. Scholey, R. Talwar, W. B. Walters, P. J. Woods, S. Zhu, Phys. Rev. Lett. **121**, 182501 (2018). https://doi.org/10.1103/PhysRevLett.121.182501

[17] **2019Lu08** D. Lubos, J. Park, T. Faestermann, R. Gernhauser, R. Krucken, M. Lewitowicz, S. Nishimura, H. Sakurai, D. S. Ahn, H. Baba, B. Blank, A. Blazhev, P. Boutachkov, F. Browne, I. Celikovic, G. de France, P. Doornenbal, Y. Fang, N. Fukuda, J. Giovinazzo, N. Goel, M. Gorska, S. Ilieva, N.Inabe, T.Isobe, A.Jungclaus, D.Kameda, Y.K.Kim, I.Kojouharov, T.Kubo, N.Kurz, Y.K.Kwon, G.Lorusso, K.Moschner, D.Murai, I. Nishizuka, Z. Patel, M. M.Rajabali, S. Rice, H. Schaffner, Y. Shimizu, L. Sinclair, P. -A. Soderstrom, K. Steiger, T. Sumikama, H. Suzuki, H. Takeda, Z. Wang, N. Warr, H. Watanabe, J. Wu, Z. Xu, Phys. Rev. Lett. **122**, 222502 (2019). https://doi.org/10.1103/PhysRevLett.122.222502

[18] **2019Pa16** J. Park, R. Krucken, D. Lubos, R. Gernhauser, M. Lewitowicz, S. Nishimura, D. S. Ahn, H. Baba, B. Blank, A. Blazhev, P. Boutachkov, F. Browne, I. Celikovic, G. de France, P. Doornenbal, T. Faestermann, Y. Fang, N. Fukuda, J. Giovinazzo, N. Goel, M. Gorska, H. Grawe, S. Ilieva, N. Inabe, T. Isobe, A. Jungclaus, D. Kameda, G. D. Kim, Y. -K. Kim, I. Kojouharov, T. Kubo, N. Kurz, Y. K. Kwon, G. Lorusso, K. Moschner, D. Murai, I. Nishizuka, Z. Patel, M. M. Rajabali, S. Rice, H. Sakurai, H. Schaffner, Y. Shimizu, L. Sinclair, P. -A. Soderstrom, K. Steiger, T. Sumikama, H. Suzuki, H. Takeda, Z. Wang, H. Watanabe, J. Wu, Z. Y. Xu, Phys. Rev. C **99**, 034313 (2019). https://doi.org/10.1103/PhysRevC.99.034313

[19] **2019Xi06** Y. Xiao, S. Go, R. Grzywacz, R. Orlandi, A. N. Andreyev, M. Asai, M. A. Bentley, G. de Angelis, C. J. Gross, P. Hausladen, K. Hirose, S. Hofmann, H. Ikezoe, D. G. Jenkins, B. Kindler, R. Leguillon, B. Lommel, H. Makii, C. Mazzocchi, K. Nishio, P. Parkhurst, S. V. Paulauskas, C. M. Petrache, K. P. Rykaczewski, T. K. Sato, J. Smallcombe, A. Toyoshima, K. Tsukada, K. Vaigneur, R. Wadsworth, Phys. Rev. C **100**, 034315 (2019). https://doi.org/10.1103/PhysRevC.100.034315

[20] **2021Wa16** M. Wang, W. J. Huang, F. G. Kondev, G. Audi, S. Naimi, Chin. Phys. C **45**, 030003 (2021). https://doi.org/10.1088/1674-1137/abddaf