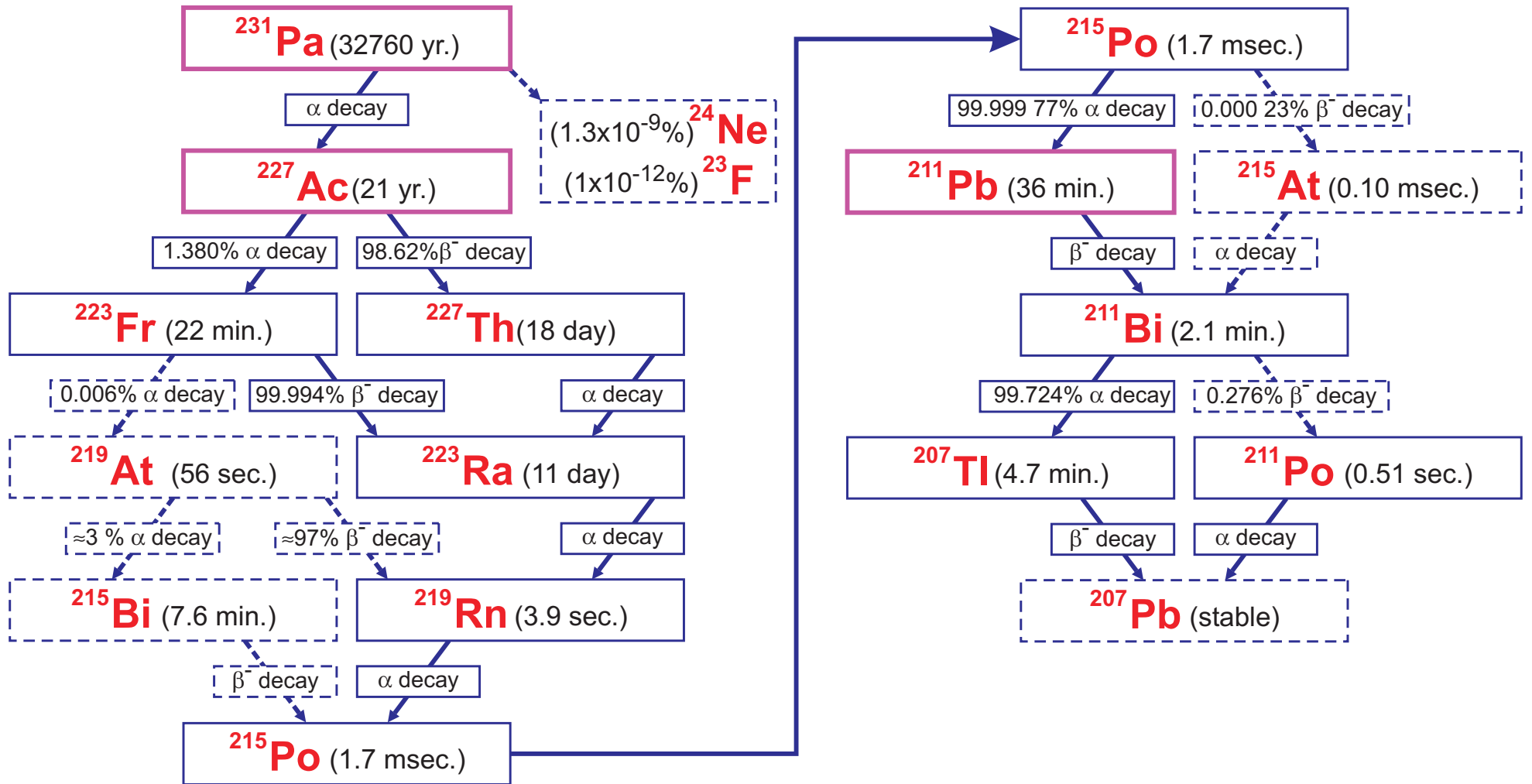


## Simplified Decay Chain



# <sup>231</sup>Pa (32760 yr.) Decay Scheme

Part 1 of 2

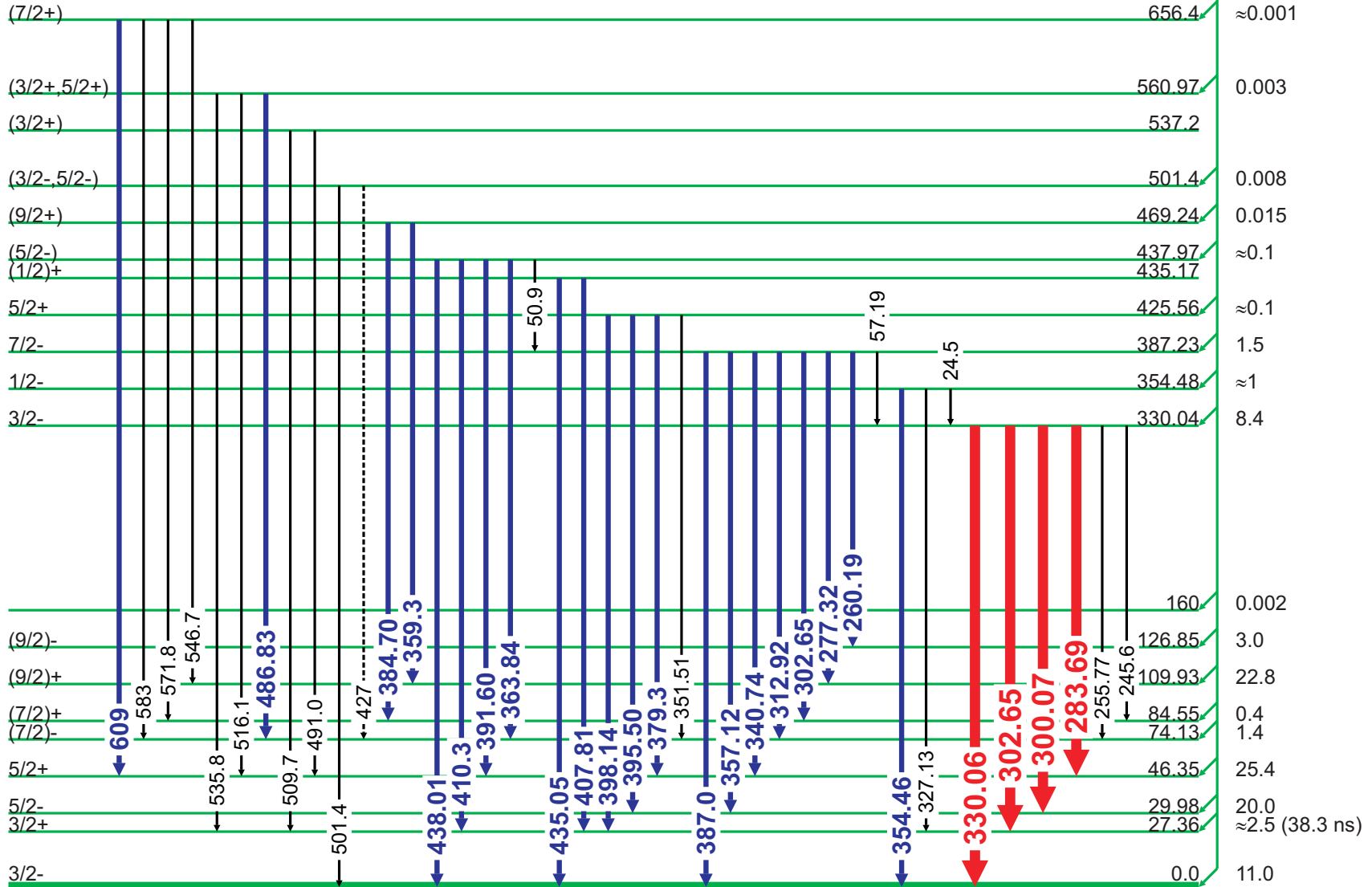
3.276x10<sup>4</sup> yr.

3/2- 0.0

Q<sub>α</sub> = 5148.2

<sup>231</sup><sub>91</sub>Pa

100% α decay



Based on 8/5/1999 NNDC/BNL Data

<sup>227</sup><sub>89</sub>Ac

21.773 yr.

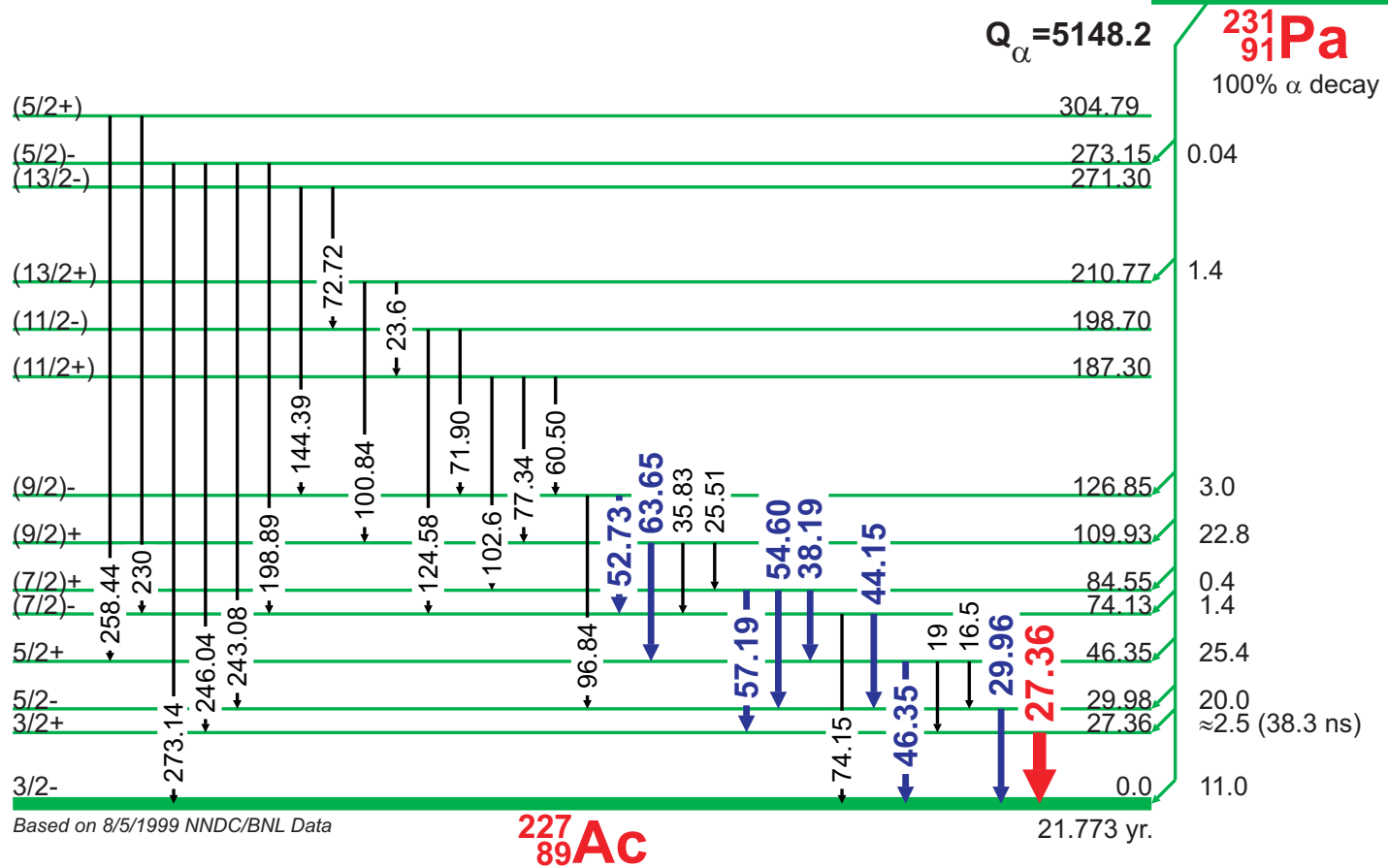
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# <sup>231</sup>Pa (32760 yr.) Decay Scheme

Part 2 of 2

**3.276x10<sup>4</sup> yr.**  
3/2- 0.0



## GAMMA-RAY ENERGIES AND INTENSITIES (page 1 of 2)

Nuclide: **<sup>231</sup>Pa**E<sub>γ</sub>, σE<sub>γ</sub>, I<sub>γ</sub>, σI<sub>γ</sub> Levels- from ENSDF Database as of August 5, 1999

Half Life: 32760(110) yr.

E <sub>γ</sub> (keV)	σ E <sub>γ</sub>	<sup>①</sup> I <sub>γ</sub>	<sup>②</sup> σ I <sub>γ</sub>	Level	
10.9	0.5				α
12.4	0.5				α
14.1	0.1				α
15.5	0.5				α
16.5	0.1	0.31	0.09	46.35	α
18.2	0.5				α
19		0.37	0.12	46.35	α
19.6					α
22.7					α
23.6		0.004 8	0.001 0	210.77	α
24.5	0.1	0.005	≈	354.48	α
25.51	0.06	0.117	0.017	109.93	α
27.0					α
<b>27.36</b>	<b>0.01</b>	<b>10.3</b>	<b>0.4</b>	<b>27.36</b>	<b>α</b>
29.96	0.02	0.109	0.007	29.98	α
31.00	0.05	0.010 0	0.002 6		α
31.54	0.05	0.007 0	0.002 4		α
34.0					α
35.83	0.03	0.016 2	0.000 9	109.93	α
38.19	0.01	0.160	0.009	84.55	α
39.73	0.03	0.002 4	0.001 7		α
39.97	0.02	0.013 1	0.002 6		α
42.48	0.05	0.006 0	0.001 2		α
43.05	0.05	0.007 0	0.000 3		α
44.15	0.01	0.065	0.005	74.13	α
46.35	0.02	0.223	0.009	46.35	α
50.9	0.1	0.001 55	0.000 07	437.97	α
52.73	0.02	0.085	0.005	126.85	α
54.60	0.02	0.077	0.005	84.55	α
56.76	0.04	0.006 1	0.001 4		α
57.19	0.03	0.002 9	0.000 5	387.23	α
57.19	0.03	0.026 9	0.002 7	84.55	α
60.50	0.03	0.006 5	0.001 0	187.30	α
63.65	0.02	0.049 6	0.004 1	109.93	α

E <sub>γ</sub> (keV)	σ E <sub>γ</sub>	<sup>①</sup> I <sub>γ</sub>	<sup>②</sup> σ I <sub>γ</sub>	Level	
70.50	0.05	0.007 0	0.001 4		α
71.90	0.07	0.001 9	0.001 0	198.70	α
72.72	0.10	0.003 7	0.001 4	271.30	α
74.15	0.04	0.023 6	0.002 9	74.13	α
77.34	0.03	0.073 3	0.002 4	187.30	α
96.0					α
96.84	0.03	0.095	0.005	126.85	α
100.84	0.05	0.030 4	0.003 6	210.77	α
102.6	0.5	0.014	0.000	187.30	α
106.0	0.5				α
124.58	0.06	0.004 8	0.001 2	198.70	α
144.39	0.06	0.011 9	0.001 0	271.30	α
198.89	0.10	0.004 9	0.000 7	273.15	α
230	1	0.001 7	0.000 9	304.79	α
242.2	0.1	0.009 0	0.001 4		α
243.08	0.07	0.048 3	0.003 4	273.15	α
245.6	0.1	0.007 8	0.000 9	330.04	α
246.04	0.08	0.011 1	0.001 5	273.15	α
255.77	0.05	0.112	0.005	330.04	α
258.44	0.09	0.002 45	0.000 43	304.79	α
260.19	0.06	0.187 9	0.002 4	387.23	α
273.14	0.06	0.059 7	0.002 2	273.15	α
277.32	0.01	0.069 4	0.003 4	387.23	α
<b>283.69</b>	<b>0.01</b>	<b>1.70</b>		<b>330.04</b>	<b>α</b>
286.55	0.10	0.010 0	0.001 5		α
<b>300.07</b>	<b>0.01</b>	<b>2.47</b>	<b>0.07</b>	<b>330.04</b>	<b>α</b>
<b>302.65</b>	<b>0.01</b>	<b>2.19</b>	<b>0.27</b>	<b>330.04</b>	<b>α</b>
<b>302.65</b>	<b>0.05</b>	<b>0.68</b>	<b>0.10</b>	<b>387.23</b>	<b>α</b>
310.0	0.1	0.001 5	0.000 5		α
312.92	0.04	0.101 7	0.002 7	387.23	α
318.1	0.7	0.003	0.002		α
327.13	0.08	0.038 1	0.003 9	354.48	α
<b>330.06</b>	<b>0.01</b>	<b>1.396</b>	<b>0.020</b>	<b>330.04</b>	<b>α</b>
340.74	0.05	0.180 5	0.002 7	387.23	α

① These I<sub>γ</sub> are per 100 Decays of <sup>231</sup>Pa.

② For total uncertainty add systematic component of 5.89% in quadrature, based on the normalization factor 0.017(1)



## GAMMA-RAY ENERGIES AND INTENSITIES (page 2 of 2)

Nuclide: **<sup>231</sup>Pa**E<sub>γ</sub>, σE<sub>γ</sub>, I<sub>γ</sub>, σI<sub>γ</sub> Levels- from ENSDF Database as of August 5, 1999

Half Life: 32760(110) yr.

E <sub>γ</sub> (keV)	σ E <sub>γ</sub>	① I <sub>γ</sub>	② σ I <sub>γ</sub>	Level	
351.51	0.07	0.007 3	0.001 4	425.56	α
354.46	0.05	0.100 3	0.002 6	354.48	α
357.12	0.09	0.175	0.007	387.23	α
359.3	0.1	0.009 0	0.001 0	469.24	α
363.84	0.07	0.007 8	0.000 7	437.97	α
374.93	0.01	0.004 9	0.000 7		α
379.3	0.1	0.050 3	0.001 5	425.56	α
384.70	0.07	0.003 7	0.000 5	469.24	α
387.0	0.1	0.000 49	0.000 17	387.23	α
391.60	0.07	0.007 8	0.000 7	437.97	α
395.50	0.07	0.002 24	0.000 26	425.56	α
398.14	0.06	0.008 8	0.001 0	425.56	α
407.81	0.02	0.036 2	0.001 9	435.17	α
410.3	0.1	0.003 2	0.000 5	437.97	α

E <sub>γ</sub> (keV)	σ E <sub>γ</sub>	① I <sub>γ</sub>	② σ I <sub>γ</sub>	Level	
427	1	0.000 7	0.000 3	501.4	α
435.05	0.07	0.003 11	0.000 15	435.17	α
438.01	0.07	0.004 56	0.000 39	437.97	α
438.7	0.1	0.001 5	0.000 5		α
486.83	0.02	0.001 99	0.000 34	560.97	α
491.0	0.5	0.000 53	0.000 10	537.2	α
501.4	0.4	0.000 85	0.000 29	501.4	α
509.7	0.6	0.001 19	0.000 31	537.2	α
516.1	0.5	0.001 02	0.000 27	560.97	α
535.8	0.5	0.000 60	0.000 10	560.97	α
546.7	0.5	0.000 87	0.000 20	656.4	α
571.8	0.5	0.000 53	0.000 10	656.4	α
583	1	0.004 4	0.000 2	656.4	α
609	1	0.007 3	0.000 3	656.4	α

① These I<sub>γ</sub> are per 100 Decays of <sup>231</sup>Pa.

② For total uncertainty add systematic component of 5.89% in quadrature, based on the normalization factor 0.017(1)

