Table II. Reaction rates

Reaction : ^{1}H(p,νe^+)^{2}H

The rates are essentially determined from theoretical calculations using the S-factor $S(E) = \mathcal{S}_0 + \mathcal{S}_1\,E + \mathcal{S}_2\,E^2$. Only $\mathcal{S}_0$ and $\mathcal{S}_1$ are available in the literature [BA69c, BR71, BA88a, GO90, CA91, BA92]. Following KA94, the S-factor at zero energy

$$S(0) = 3.89 \times 10^{-25} \left(\frac{\lambda^2(0)}{6.92}\right) \left(\frac{G_A/G_V}{1.2573}\right)^2 \left(\frac{1+\delta}{1.01}\right)^2 \left(\frac{f_{\rm pp}(0)}{0.142}\right) \ \text{MeV b} \qquad (44)$$

is expressed in terms of the nuclear overlap $\lambda^2(0)$, the ratio of the axial vector to the vector coupling constant $G_{\rm A}/G_{\rm V}$, the correction $(1+\delta)$ to the nuclear matrix element due to exchanges of π and ρ mesons, and the phase space factor $f_{\rm pp}(0)$. The value $\lambda^2(0) = 6.9 \times (1^{+0.07}_{-0.015})$ is adopted, where the central value is from KA94, and the uncertainty is the range of published values [SA52, BA69c, BR71, GA72, BA79a, GO90, KA94]. A weighted mean of the available experimental results [BY95, PA96] gives $G_{\rm A}/G_{\rm V} = -1.268 \pm 0.004$. The value $\delta = 0.01 \pm 0.01$ is adopted on grounds of the most recent calculations [BA79a, CA91]. Former results [BL65, GA72, DA76] include only π contributions. The value $f_{\rm pp}(0) = 0.142$ from BA69c is adopted. A 1.5 % radiative correction taken from neutron decay is introduced empirically in AD98. As such a correction is sensitive to the varying endpoint energy and is not available for the present reaction, we do not include it here. For $\mathcal{S}_1/\mathcal{S}_0$, the most recent result of CA91, $\mathcal{S}_1/\mathcal{S}_0 = 11.7$ MeV^{-1}, is adopted (similar evaluations are presented in BA69c, BR71 and BA79a). For $\mathcal{S}_2/\mathcal{S}_0$, the cross section from $E = 0$ to 1 MeV is computed in the present work with two different nucleon–nucleon potentials [RE68, TH77], leading to $\mathcal{S}_2/\mathcal{S}_0 = 75 \pm 10$ MeV^{-2}. Finally, we adopt $S(E) = 3.94 \times 10^{-25} \times (1 + 11.7\,E + 75\,E^2)$ MeV b, with E in MeV. The corresponding adopted rates are in good agreement with the CA88 ones except at high temperatures. This is mainly due to the higher value for $\mathcal{S}_1/\mathcal{S}_0$ used here, and to the introduction of the $\mathcal{S}_2/\mathcal{S}_0$ term omitted in CA88.

T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio	T_9	low	adopt	high	exp	ratio
0.002	5.43	5.57	5.99	-25	1.0	0.05	3.65	3.76	4.06	-18	1.0	0.6	3.67	3.96	4.47	-16	1.6
0.003	1.24	1.28	1.37	-23	1.0	0.06	5.74	5.91	6.38	-18	1.0	0.7	4.67	5.06	5.74	-16	1.7
0.004	8.82	9.06	9.75	-23	1.0	0.07	8.22	8.47	9.15	-18	1.0	0.8	5.75	6.27	7.15	-16	1.8
0.005	3.53	3.62	3.90	-22	1.0	0.08	1.11	1.14	1.23	-17	1.0	0.9	6.92	7.58	8.68	-16	2.0
0.006	1.01	1.04	1.11	-21	1.0	0.09	1.42	1.47	1.59	-17	1.0	1	8.17	8.99	10.3	-16	2.1
0.007	2.33	2.39	2.57	-21	1.0	0.1	1.77	1.83	1.98	-17	1.0	1.25	1.16	1.29	1.50	-15	2.4
0.008	4.62	4.74	5.11	-21	1.0	0.11	2.14	2.21	2.40	-17	1.0	1.5	1.56	1.75	2.03	-15	2.7
0.009	8.24	8.46	9.10	-21	1.0	0.12	2.53	2.62	2.85	-17	1.0	1.75	2.00	2.25	2.64	-15	3.1
0.01	1.35	1.39	1.49	-20	1.0	0.13	2.95	3.06	3.32	-17	1.1	2	2.49	2.81	3.31	-15	3.4
0.011	2.09	2.14	2.30	-20	1.0	0.14	3.39	3.51	3.82	-17	1.1	2.5	3.59	4.09	4.83	-15	4.1
0.012	3.05	3.13	3.37	-20	1.0	0.15	3.84	3.99	4.34	-17	1.1	3	4.85	5.55	6.59	-15	4.8
0.013	4.29	4.41	4.74	-20	1.0	0.16	4.32	4.49	4.89	-17	1.1	3.5	6.26	7.19	8.56	-15	5.5
0.014	5.83	5.98	6.44	-20	1.0	0.18	5.31	5.53	6.04	-17	1.1	4	7.81	9.00	10.7	-15	6.2
0.015	7.70	7.90	8.51	-20	1.0	0.2	6.37	6.64	7.27	-17	1.1	5	1.13	1.31	1.57	-14	7.6
0.016	0.99	1.02	1.10	-19	1.0	0.25	9.24	9.69	10.6	-17	1.2	6	1.53	1.77	2.13	-14	9.0
0.018	1.55	1.59	1.71	-19	1.0	0.3	1.24	1.31	1.44	-16	1.2	7	1.97	2.30	2.76	-14	10
0.02	2.27	2.34	2.52	-19	1.0	0.35	1.59	1.68	1.86	-16	1.3	8	2.46	2.87	3.46	-14	12
0.025	4.89	5.02	5.41	-19	1.0	0.4	1.96	2.08	2.31	-16	1.3	9	2.98	3.48	4.21	-14	13
0.03	8.72	8.96	9.66	-19	1.0	0.45	2.35	2.51	2.80	-16	1.4	10	3.54	4.15	5.01	-14	15
0.04	2.02	2.08	2.24	-18	1.0	0.5	2.77	2.96	3.32	-16	1.5						