Appendix 5
Common notations for helicity amplitudes

We list here some of the conventional notations for the helicity amplitudes in specific reactions.[1]

(1) Meson–baryon scattering (Halzen and Michael, 1971):

$$H_{++} = H_{0\,1/2;0\,1/2} \qquad H_{+-} = H_{0\,1/2;0-1/2}$$

(2) Nucleon-nucleon scattering (Goldberger *et al.*, 1960):

$$\phi_1 = H_{1/2\,1/2;1/2\,1/2} \qquad \phi_3 = H_{1/2-1/2;1/2-1/2}$$
$$\phi_2 = H_{1/2\,1/2;-1/2-1/2} \qquad \phi_4 = H_{1/2-1/2;-1/2\,1/2}$$
$$\phi_5 = H_{1/2\,1/2;1/2-1/2}.$$

(3) Baryon–baryon scattering with non-identical particles, e.g. $\Lambda p \to \Lambda p$ (Buttimore *et al.*, 1978): In addition to the five ϕ_i listed above for $NN \to NN$ one has also

$$\phi_6 = H_{1/2\,1/2;-1/2\,1/2}.$$

For identical particles one has $\phi_6 = -\phi_5$.

(4) Photoproduction of a pseudoscalar meson (Storrow, 1978):

$$N = H_{0-1/2;1\,1/2} \qquad S_2 = H_{0\,1/2;1\,1/2}$$
$$S_1 = H_{0-1/2;1-1/2} \qquad D = H_{0\,1/2;1-1/2}.$$

(5) Vector meson production amplitudes in $0^-(1/2)^+ \to 1^-(1/2)^+$:

$$P^0_{\lambda\mu} = H_{0\mu;0\lambda} \qquad P^{\pm}_{\lambda\mu} = \frac{1}{\sqrt{2}}\left(H_{1\mu;0\lambda} \pm H_{-1\mu;0\lambda}\right).$$

[1] We have not included normalization factors.

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(6) Baryon resonance production amplitudes in $0^-(1/2)^+ \to 0^-(3/2)^+$: there are four s-channel helicity amplitudes, two single-flip, one non-flip and one double-flip:

$$M_0 = H_{0\,1/2;0\,1/2} = H_{0-1/2;0-1/2} \qquad M_1' = H_{0\,1/2;0-1/2} = -H_{0-1/2;0\,1/2}$$
$$M_1 = H_{0\frac{3}{2};0\,1/2} = -H_{0-\frac{3}{2};0-1/2} \qquad M_2 = H_{0\frac{3}{2};0-1/2} = H_{0-\frac{3}{2};0\,1/2}.$$

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