

25.40Cm/25.55Ci/25.80Dj/25.80Fm/25.80Nv.

C

RADIATIVE CORRECTIONS IN ELASTIC AND INELASTIC HADRONIC COLLISIONS

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Radiative corrections in hadronic reactions ^{1,2)} have almost never been applied to data. Recent accurate experimental data, specially with pions, require the inclusion of these effects. Measured cross sections should then be multiplied by the corrective term :

$$e^{\delta(\Delta E_3)}, \text{ with } \Delta E_3 = E_3(\theta_{av}) - E_3^{\min}$$

and E_3^{\min} the energy cut-off on the spectrum of detected particles.¹⁾

Using the formalism developed by Sogard¹⁾, a general expression for any two body hadronic collision, $A + B \rightarrow C + D$, is derived allowing to calculate $\delta(\Delta E_3)$, and numerical results are found to be significant compared to accuracies of available data.³⁾ In the table the fractional changes ($e^\delta - 1$) for measured cross sections are given for some specific elastic and inelastic reactions on ^{40}Ca at $\theta_{\text{lab}} = 45^\circ$ and 135° , for $\Delta E = 0.5$ MeV.

| Reaction | T_{lab} (MeV) | $e^\delta - 1$ (%) | |
|---|---------------------------|-----------------------|-------------|
| | | 45° | 135° |
| $^{40}\text{Ca}(\pi^+, \pi^+)^{40}\text{Ca}$ | { 150 400 | 1.3 4.0 | 3.8 7.0 |
| $^{40}\text{Ca}(\pi^-, \pi^-)^{40}\text{Ca}$ | { 150 400 | 1.7 5.1 | 6.1 13.6 |
| $^{40}\text{Ca}(\pi^+, p)^{39}\text{Ca}$ | { 150 400 | 1.0 2.7 | 1.7 3.3 |
| $^{40}\text{Ca}(k^+, k^+)^{40}\text{Ca}$ | 500 | 1.1 | 2.3 |
| $^{40}\text{Ca}(K^-, K^-)^{40}\text{Ca}$ | 500 | 2.7 | 11.3 |
| $^{40}\text{Ca}(p, p)^{40}\text{Ca}$ | 1000 | 1.1 | 1.5 |
| $^{40}\text{Ca}(^3\text{He}, ^3\text{H})^{40}\text{Sc}$ | 2000 | 3.3 | 5.1 |

References

1. M.R. Sogard, Phys. Rev. D9 (1974) 1486.
2. E. Borie, Phys. Lett. 68B (1977) 433.
3. B. Saghai, Rapport Interne DPh-N/HE-83/2 (1983).