# Correction to LAW=6 (n-body phase space)

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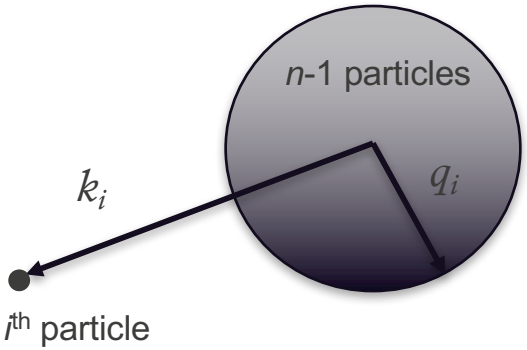
# *n*-Body Phase-Space Formula




$$P_{CM} \approx k_i q_i^{3(n-1)-5} \sim \sqrt{E'}(E_i^{max} - E')^{3n/2-4}$$

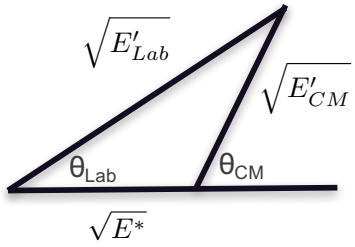
Normalizing constants $C_n$ come from

$$C_n = \frac{1}{2\bar{P}_0}, \text{with}$$

$$\bar{P}_0 = \int_0^{E_i^{max}} dE' \sqrt{E'}(E_i^{max} - E')^{3n/2-4}$$

$$= \frac{\sqrt{\pi}\Gamma[\frac{3}{2}(n-2)]}{2\Gamma[\frac{3}{2}(n-1)]} E_i^{max\,(3n-5)/2}$$

velocity triangle:




$$E'_{CM} = E^\star + E'_{Lab} - 2\sqrt{E^\star E'_{Lab}}\cos\theta_{Lab}$$

$$E^* = \frac{m_{inc} m_i E}{M^2}$$ (energy of CM in Lab system)

# LAW=6 Description in ENDF-102

**6.2.7 N-Body Phase-Space Distributions (LAW=6)**

In the absence of detailed information, it is often useful to use *n*-body phase-space distributions for the particles emitted from neutron and charged- particle reactions. These distributions conserve energy and momentum, and they provide reasonable kinematic limits for secondary energy and angle in the LAB system.

The phase-space distribution for particle *i* in the CM system is

$$P_i^{cm}(\mu, E, E') = C_n \sqrt{E'} (E_i^{\max} - E')^{(3n/2)-4} \quad (6.19)$$

where $E_i^{max}$ is the maximum possible center-of-mass energy for particle *i*, $\mu$ and $E'$ are in the cm system, and $C_n$ are normalization constants: …

In the laboratory system, the distributions become

$$P_i^{lab}(\mu, E, E') = C_n \sqrt{E'} \left[ E_i^{\max} - \left( E^* + E' - 2\mu\sqrt{E^* E'} \right) \right]^{(3n/2)-4} \quad (6.23)$$

where $\mu$ and $E'$ are in the laboratory system and $E^*$ is given by

$$E^* = E \frac{A^{incident}}{(AWR + A^{exit})^2} \quad \Rightarrow \quad E^* = E \frac{A^{incident}\, A^{exit}}{(AWR + A^{incident})^2} \quad (6.24)$$

$A^{incident}$ and $A^{exit}$ are the ratios of the incident and exit particles, respectively.