Flux

In the set up of the computation of the scattering amplitude, we already fixed the from of the incoming waves.

→ flux is assumed.

But, in a collider experiment, the flux is set by the machine luminosity.

To make contact, cross sections are defined in a flux/luminosity independent way.

$$\sigma = \frac{1}{\text{Flux}} \int |\mathcal{A}(s,t)|^2 \, d(PS)$$

1 → ← 2

$$\begin{aligned}
\text{Flux} &= |\vec{v}_{12}| \, 2E_1 \, 2E_2 \\
&= 4\left(|\vec{p}_1| E_2 + |\vec{p}_2| E_1\right) \\
&= 4\left((p_1 \cdot p_2)^2 - m_1^2 m_2^2\right)^{1/2} \quad \leftarrow \text{Manifestly L. invariant} \\
&= 2\lambda^{1/2}(s, m_1^2, m_2^2)
\end{aligned}$$