Note 230(4)a : Check of Eq. (5)

This equation is obtained by defining:

$$(q^a_\mu p^\mu) p_\mu := q^a_\mu (p^\mu p_\mu)$$

$$= m^2 c^2 q^a_\mu \quad — (1)$$

This implies:

$$q^a_\mu = \frac{1}{m^2 c^2} p^a p_\mu \quad — (2)$$

$$= \frac{1}{m^2 c^2} (q^a_\mu p^\mu) p_\mu$$

$$= p^a p_\mu / (m^2 c^2)$$

So: $$p^a = q^a_\mu q^\mu = \frac{p^a p_\mu}{m^2 c^2} p^\mu$$

$$= p^a \left(p_\mu p^\mu / (m^2 c^2) \right)$$

$$= p^a$$

QED

So $p^a p_\mu$ is a tensor product.