

### 3-5

证明任何共轭旋量  $\bar{f} = f^\dagger(p)\gamma_4$  可用  $\bar{u}_i$  和  $\bar{v}_i$  展开

$$\bar{f}(p) = a'_i \bar{u}_i(\vec{p}) + b'_i \bar{v}_i(\vec{p})$$

其中

$$a'_i = \frac{E}{m} \bar{f}(p) u_i(\vec{p})$$

$$b'_i = -\frac{E}{m} \bar{f}(p) v_i(\vec{p})$$

证明：

设  $\bar{f}(p)$  可展为：

$$\bar{f}(p) = a'_i \bar{u}_i(\vec{p}) + b'_i \bar{v}_i(\vec{p})$$

由

$$u_i \bar{u}_i - v_i \bar{v}_i = \frac{m}{E} I$$

对  $\bar{f}(p)$

$$\bar{f}(p) = \bar{f}(p) I = \frac{E}{m} \bar{f}(p) u_i \bar{u}_i - \frac{E}{m} \bar{f}(p) v_i \bar{v}_i$$

对比可得：

$$a'_i = \frac{E}{m} \bar{f}(p) u_i, \quad b'_i = -\frac{E}{m} \bar{f}(p) v_i$$