

Errata for Chapter 11 of Subatomic Physics (3rd edition).

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- 1) Figure 11.8 on page 348: The caption should read “*Positron* spectrum...” instead of “*Electron* spectrum...”. The paragraph on the right of the figure has the same mistake several times: all the instances of *electron* should be changed to *positron*. The spectra are measured from the decay of μ^+ rather than from μ^- because the latter can be captured into muonic atoms and introduce unwanted distortions.
- 2) Eqs. 11.48, and 11.49 (and the unnumbered Eq. following Eq. 11.42): What is stated here, that there is a difference between the decay rate w_μ and its parity mirror, w_μ^P , needs some remarks. This is true for example in the scattering of longitudinally polarized electrons (or hadrons) off nuclei. The rates w_μ and w_μ^P should be interpreted as the reaction rates corresponding to the two polarization states. In the case of observations of decays of polarized parents, the assertion that there is a difference between w_μ and w_μ^P is only true about the differential decay rates $dw_\mu(E_e)$ and $dw_\mu^P(E_e)$ that give the transition rates for emission of electrons (or positrons) in a particular direction. Once the spectrum is integrated over the electron (positron) emission directions, the interference term cancels and the parity violation is not observable. Thus, as is obvious in Eq. 11.52, for example, there is no way of checking for parity violation without looking at the electron’s direction with respect to the spin of the parent muon.
- 3) Eq. 11.52: missing here is a statement indicating that the equation is valid only for $0 < E_e < \frac{m_\mu c^2}{2}$. For $E_e > \frac{m_\mu c^2}{2}$ there is no decay probability. This restriction originates in the conservation of momentum and energy: in order for the electron to get the maximum possible energy its momentum should be equal and opposite to the total momenta of the two neutrinos and consequently, because all the particles are practically massless, will have half of the total available energy (mass of the muon).
- 4) At the end of the phrase following Eq. 11.52 there is a reference to “Fig. 11.7” which should read “Fig. 11.8”.