# Behavior of Passarino-Veltman functions at infinity

It is always possible to convert the problem of analyzing a Passarino-Veltman function at infinity into one of analyzing it near zero. Consider the behavior of $B_{0\cdots 01\cdots 1}(s;m_0,m_1)$ near $m_0 \to \infty$:

$$B_{\underbrace{0\cdots 0}_{2r}\underbrace{1\cdots 1}_{n}}(s;m_0,m_1) = [\text{Prefactor}]\,\mu^{2\epsilon}\int_0^1 dx\,\frac{x^n}{\left[s x^2 + (-s+m_1^2-m_0^2)x + m_0^2 - i\varepsilon\right]^{\epsilon - r}}$$

Factor out $m_0$ from denominator:

$$B_{\underbrace{0\cdots 0}_{2r}\underbrace{1\cdots 1}_{n}}(s;m_0,m_1) = [\text{prefactor}]\,\mu^{2\epsilon}\frac{1}{(m_0^2)^{\epsilon-r}}\int_0^1 dx\,\frac{x^n}{\left[\frac{s}{m_0^2}x^2 + \left(\frac{-s+m_1^2-m_0^2}{m_0^2}\right)x + 1 - \frac{i\varepsilon}{m_0^2}\right]^{\epsilon-r}}$$

$$= \frac{(m_0^2)^r}{(m_0^2)^{\epsilon}}\,B_{\underbrace{0\cdots 0}_{2r}\underbrace{1\cdots 1}_{n}}\left(\frac{s}{m_0^2},\,1,\,\frac{m_1}{m_0}\right).$$

All that is needed is the behavior of $B_{0\cdots 01\cdots 1}$ near $(0,\,1,\,0)$.

since $m_0 \to \infty$ means $\frac{s}{m_0^2},\ \frac{m_1}{m_0} \to 0$.

More generally, to determine the $x^2 \to \infty$ behavior of a Passarino-Veltman function, just rescale the rest of its arguments:

$$\boxed{T^{\{\nu_0\cdots\nu_{N-1}\}\,d}_{\underbrace{0\cdots 0}_{2r}\underbrace{1\cdots 1}_{n_1}\cdots\underbrace{N\text{-}1\cdots N\text{-}1}_{n_{N-1}}}(s,\ldots,x\cdots m\ldots) = x^{r+\frac{d}{2}-\nu_0-\cdots-\nu_{N-1}}\,T^{\{\nu_0\cdots\nu_{N-1}\}\,d}_{\underbrace{0\cdots 0}_{2r}\cdots\underbrace{(N-1)\cdots(N-1)}_{n_{N-1}}}\left(\frac{s}{x^2},\ldots 1,\ldots\frac{m}{x}\right)}$$

Note: The mass dimension of a Passarino-Veltman function is $[T] = r + \frac{d}{2} - \nu_0 - \ldots - \nu_{N-1}$.