# Numerical computation of Feynman loop integrals

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In high energy physics it is required to obtain the scattering amplitude with higher order corrections in the perturbation theory. We propose the direct numerical methods without any analytic continuation for the numerical computation of Feynman loop integrals. Using Double Exponential integration method with *epsilon* extrapolation technique, an one-loop box integral with an infra-red divergence is computed in the quadruple precision. It is given as

$$I = \int_0^1 dx \int_0^{1-x} dy \int_0^{1-x-y} dz \frac{1}{D^2} \tag{1}$$

where

$$D = -xys - tz(1-x-y) + (x+y)\lambda^2 + (1-x-y-z)(1-x-y)m_e^2 + z(1-x-y)m_f^2 \tag{2}$$

In SX-8R, the sustained performance is about 20Gflops per CPU in the double precision. NEC provided the ASLQUAD library for the quadruple precision calculation in the vector processor. Using it, we estimate the performance about 1GQ(uadruple)flops per CPU for our computation. In future we will investigate the availability of the direct numerical method for a pentagon-loop integral and a hexagon-loop integral which are too difficult to get an analytical expressions.