

Divergent box integrals

We list here the basis set of 16 divergent box integrals; all other divergent box integrals can be derived from this set. The demonstration that this forms a complete set is given [here](#).

Integrals with zero internal masses:-

1. $I_4^{\{D=4-2\epsilon\}}(0, 0, 0, 0; s_{12}, s_{23}; 0, 0, 0, 0)$
2. $I_4^{\{D=4-2\epsilon\}}(0, 0, 0, p_4^2; s_{12}, s_{23}; 0, 0, 0, 0)$
3. $I_4^{\{D=4-2\epsilon\}}(0, p_2^2, 0, p_4^2; s_{12}, s_{23}; 0, 0, 0, 0)$, "two opposite offshellness (easy)"
4. $I_4^{\{D=4-2\epsilon\}}(0, 0, p_3^2, p_4^2; s_{12}, s_{23}; 0, 0, 0, 0)$, "two adjacent offshellness (hard)"
5. $I_4^{\{D=4-2\epsilon\}}(0, p_2^2, p_3^2, p_4^2; s_{12}, s_{23}; 0, 0, 0, 0)$

Integrals with one non-zero internal mass:-

6. $I_4^{\{D=4-2\epsilon\}}(0, 0, m^2, m^2; s_{12}, s_{23}; 0, 0, 0, m^2)$
7. $I_4^{\{D=4-2\epsilon\}}(0, 0, m^2, p_4^2; s_{12}, s_{23}; 0, 0, 0, m^2)$
8. $I_4^{\{D=4-2\epsilon\}}(0, 0, p_3^2, p_4^2; s_{12}, s_{23}; 0, 0, 0, m^2)$
9. $I_4^{\{D=4-2\epsilon\}}(0, p_2^2, p_3^2, m^2; s_{12}, s_{23}; 0, 0, 0, m^2)$
10. $I_4^{\{D=4-2\epsilon\}}(0, p_2^2, p_3^2, p_4^2; s_{12}, s_{23}; 0, 0, 0, m^2)$

Integrals with two adjacent internal masses:-

11. $I_4^{\{D=4-2\epsilon\}}(0, m_3^2, p_3^2, m_4^2; s_{12}, s_{23}; 0, 0, m_3^2, m_4^2)$

12. $I_4^{\{D=4-2\epsilon\}}(0, m_3^2, p_3^2, p_4^2; s_{12}, s_{23}; 0, 0, m_3^2, m_4^2)$

13. $I_4^{\{D=4-2\epsilon\}}(0, p_2^2, p_3^2, p_4^2; s_{12}, s_{23}; 0, 0, m_3^2, m_4^2)$

Integrals with two opposite internal masses:-

14. $I_4^{\{D=4-2\epsilon\}}(m_2^2, m_2^2, m_4^2, m_4^2; s_{12}, s_{23}; 0, m_2^2, 0, m_4^2)$

15. $I_4^{\{D=4-2\epsilon\}}(m_2^2, p_2^2, p_3^2, m_4^2; s_{12}, s_{23}; 0, m_2^2, 0, m_4^2)$

Integrals with three internal masses:-

16. $I_4^{\{D=4-2\epsilon\}}(m_2^2, p_2^2, p_3^2, m_4^2; s_{12}, s_{23}; 0, m_2^2, m_3^2, m_4^2)$

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