```
In[1]:= Sd = DiagonalMatrix[ Sqrt[{e2^2 m3^2 + e3^2 m2^2,
             e1^2 m3^2 + e3^2 m1^2,
             e1^2 m2^2 + e2^2 m1^2}]];
        Fd = DiagonalMatrix[ {e2 e3, e1 e3, e1 e2}];
        Nd = DiagonalMatrix[ {m2 m3, m1 m3, m1 m2}];

In[4]:= xi = {ξ1, ξ2, ξ3}

Out[4]= {ξ1, ξ2, ξ3}

In[5]:= NormSq[xi_] := xi[[1]]^2 + xi[[2]]^2 + xi[[3]]^2

In[6]:= Ddef = (NormSq[Sd.xi])^2 - 4 NormSq[Fd.xi] NormSq[Nd.xi]

Out[6]= -4 (e2^2 e3^2 ξ1^2 + e1^2 e3^2 ξ2^2 + e1^2 e2^2 ξ3^2) (m2^2 m3^2 ξ1^2 + m1^2 m3^2 ξ2^2 + m1^2 m2^2 ξ3^2) +
         ((e3^2 m2^2 + e2^2 m3^2) ξ1^2 + (e3^2 m1^2 + e1^2 m3^2) ξ2^2 + (e2^2 m1^2 + e1^2 m2^2) ξ3^2)^2

In[12]:= Δ12 = e1^2 m2^2 - e2^2 m1^2;
         Δ21 = -Δ12;
         Δ13 = e1^2 m3^2 - e3^2 m1^2;
         Δ23 = e2^2 m3^2 - e3^2 m2^2;
         Δ32 = -Δ23;

In[17]:= Dexp1 = Δ23^2 ξ1^4 + Δ13^2 ξ2^4 + Δ12^2 ξ3^4 +
            2 Δ23 Δ13 ξ1^2 ξ2^2 - 2 Δ23 Δ12 ξ1^2 ξ3^2 + 2 Δ13 Δ12 ξ2^2 ξ3^2;
         FullSimplify[Ddef - Dexp1]

Out[18]= 0

In[19]:= Dexp2 = (Δ23 ξ1^2 + Δ13 ξ2^2 + Δ12 ξ3^2)^2 - 4 Δ12 Δ23 ξ1^2 ξ3^2;
         FullSimplify[Dexp2 - Ddef]

Out[20]= 0

In[21]:= Dexp3 = (Δ23 ξ1^2 + Δ13 ξ2^2 + Δ21 ξ3^2)^2 - 4 Δ21 Δ13 ξ2^2 ξ3^2;
         FullSimplify[Dexp3 - Ddef]

Out[22]= 0

In[23]:= Dexp4 = (Δ32 ξ1^2 + Δ13 ξ2^2 + Δ12 ξ3^2)^2 - 4 Δ13 Δ32 ξ1^2 ξ2^2;
         FullSimplify[Dexp4 - Ddef]

Out[24]= 0

In[25]:= NotebookPrint[SelectedNotebook[],
          "/home/fdahl/writing/lis/notebooks/expressions for D.nb.ps"]
```