

Appendix

Input file of the partial uncertainties, covariance and correlation matrix analysis (Mathematica input file)

HPGe detector partial uncertainties

$$\text{In}[1] := \text{PUC} = \begin{pmatrix} 6.186 \times 10^{-5} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1.081 \times 10^{-4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 4.898 \times 10^{-5} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1.455 \times 10^{-4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 4.574 \times 10^{-5} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 3.909 \times 10^{-5} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 3.801 \times 10^{-5} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2.613 \times 10^{-5} \end{pmatrix}$$

Out[1] = {{0.00006186, 0, 0, 0, 0, 0, 0, 0}, {0, 0.0001081, 0, 0, 0, 0, 0, 0}, {0, 0, 0.00004898, 0, 0, 0, 0, 0}, {0, 0, 0, 0.0001455, 0, 0, 0, 0}, {0, 0, 0, 0, 0.00004574, 0, 0, 0}, {0, 0, 0, 0, 0, 0.00003909, 0, 0}, {0, 0, 0, 0, 0, 0, 0.00003801, 0}, {0, 0, 0, 0, 0, 0, 0, 0.00002613}}

$$\text{In}[2] := \text{PUHL} = \begin{pmatrix} 2.092 \times 10^{-4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1.556 \times 10^{-4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1.166 \times 10^{-4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1.105 \times 10^{-4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 5.215 \times 10^{-5} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 4.328 \times 10^{-5} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 3.582 \times 10^{-5} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2.851 \times 10^{-5} \end{pmatrix}$$

Out[2] = {{0.0002092, 0, 0, 0, 0, 0, 0, 0}, {0, 0.0001556, 0, 0, 0, 0, 0, 0}, {0, 0, 0.0001166, 0, 0, 0, 0, 0}, {0, 0, 0, 0.0001105, 0, 0, 0, 0}, {0, 0, 0, 0, 0.00005215, 0, 0, 0}, {0, 0, 0, 0, 0, 0.00004328, 0, 0}, {0, 0, 0, 0, 0, 0, 0.00003582, 0}, {0, 0, 0, 0, 0, 0, 0, 0.00002851}}

$$\text{In}[3] := \text{PUAC} = \begin{pmatrix} 2.698 \times 10^{-4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 2.008 \times 10^{-4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1.504 \times 10^{-4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1.426 \times 10^{-4} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 6.728 \times 10^{-5} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 5.584 \times 10^{-5} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 4.622 \times 10^{-5} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 3.678 \times 10^{-5} \end{pmatrix}$$

Out[3] = {{0.0002698, 0, 0, 0, 0, 0, 0, 0}, {0, 0.0002008, 0, 0, 0, 0, 0, 0}, {0, 0, 0.0001504, 0, 0, 0, 0, 0}, {0, 0, 0, 0.0001426, 0, 0, 0, 0}, {0, 0, 0, 0, 0.00006728, 0, 0, 0}, {0, 0, 0, 0, 0, 0.00005584, 0, 0}, {0, 0, 0, 0, 0, 0, 0.00004622, 0}, {0, 0, 0, 0, 0, 0, 0, 0.00003678}}

$$\text{In}[4] := \text{PUIG} = \begin{pmatrix} 1.331 \times 10^{-4} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 4.434 \times 10^{-4} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2.001 \times 10^{-4} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 6.237 \times 10^{-5} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 3.665 \times 10^{-4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 2.359 \times 10^{-4} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1.995 \times 10^{-4} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.389 \times 10^{-4} \end{pmatrix}$$

Out[4] = {{0.0001331, 0, 0, 0, 0, 0, 0, 0}, {0, 0.0004434, 0, 0, 0, 0, 0, 0}, {0, 0, 0.0002001, 0, 0, 0, 0, 0}, {0, 0, 0, 0.00006237, 0, 0, 0, 0}, {0, 0, 0, 0, 0.0003665, 0, 0, 0}, {0, 0, 0, 0, 0, 0.0002359, 0, 0}, {0, 0, 0, 0, 0, 0, 0.0001995, 0}, {0, 0, 0, 0, 0, 0, 0, 0.0001389}}

In[5] = Micro-correlation matrix

$$\text{MC1} = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

Out[5] = {{1, 0, 0, 0, 0, 0, 0, 0}, {0, 1, 0, 0, 0, 0, 0, 0}, {0, 0, 1, 0, 0, 0, 0, 0}, {0, 0, 0, 1, 0, 0, 0, 0}, {0, 0, 0, 0, 1, 0, 0, 0}, {0, 0, 0, 0, 0, 1, 0, 0}, {0, 0, 0, 0, 0, 0, 1, 0}, {0, 0, 0, 0, 0, 0, 0, 1}}

$$\text{In}[6] := \text{MC2} = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \end{pmatrix}$$

Out[6] = {{1, 1, 1, 1, 1, 1, 1, 1}, {1, 1, 1, 1, 1, 1, 1, 1}, {1, 1, 1, 1, 1, 1, 1, 1}, {1, 1, 1, 1, 1, 1, 1, 1}, {1, 1, 1, 1, 1, 1, 1, 1}, {1, 1, 1, 1, 1, 1, 1, 1}, {1, 1, 1, 1, 1, 1, 1, 1}, {1, 1, 1, 1, 1, 1, 1, 1}}

HPGe covariance matrix

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In[7]:= MatrixForm[In[1].In[5].In[1]+In[2].In[6].In[2]+In[3].In[6].In[3]+In[4].In[5].In[4]]
Out[7]/MatrixForm=
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$$\begin{pmatrix} 1.38099 \times 10^7 & 8.67274 \times 10^8 & 6.49706 \times 10^8 & 6.15901 \times 10^8 & 2.90619 \times 10^8 & 2.41198 \times 10^8 & 1.99637 \times 10^8 & 1.58875 \times 10^8 \\ 8.67274 \times 10^8 & 2.72821 \times 10^7 & 4.83433 \times 10^8 & 4.58279 \times 10^8 & 2.16244 \times 10^8 & 1.7947 \times 10^8 & 1.48546 \times 10^8 & 1.18216 \times 10^8 \\ 6.49706 \times 10^8 & 4.83433 \times 10^8 & 7.86548 \times 10^8 & 3.43313 \times 10^8 & 1.61996 \times 10^8 & 1.34448 \times 10^8 & 1.11281 \times 10^8 & 8.85598 \times 10^8 \\ 6.15901 \times 10^8 & 4.58279 \times 10^8 & 3.43313 \times 10^8 & 5.76053 \times 10^8 & 1.53567 \times 10^8 & 1.27452 \times 10^8 & 1.05491 \times 10^8 & 8.39518 \times 10^8 \\ 2.90619 \times 10^8 & 2.16244 \times 10^8 & 1.61996 \times 10^8 & 1.53567 \times 10^8 & 1.43661 \times 10^7 & 6.01397 \times 10^9 & 4.97769 \times 10^9 & 3.96135 \times 10^9 \\ 2.41198 \times 10^8 & 1.7947 \times 10^8 & 1.34448 \times 10^8 & 1.27452 \times 10^8 & 6.01397 \times 10^9 & 6.21681 \times 10^8 & 4.13121 \times 10^8 & 3.28771 \times 10^8 \\ 1.99637 \times 10^8 & 1.48546 \times 10^8 & 1.11281 \times 10^8 & 1.05491 \times 10^8 & 4.97769 \times 10^9 & 4.13121 \times 10^8 & 4.46644 \times 10^8 & 2.7212 \times 10^8 \\ 1.58875 \times 10^8 & 1.18216 \times 10^8 & 8.85598 \times 10^8 & 8.39518 \times 10^8 & 3.96135 \times 10^9 & 3.28771 \times 10^8 & 2.7212 \times 10^8 & 2.21416 \times 10^8 \end{pmatrix}$$

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In[8]:=
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$$\text{Corr} = \begin{pmatrix} 2690.951 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1914.462 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 3566.252 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 4166.887 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 2638.076 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 4010.893 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 4731.053 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 6721.227 \end{pmatrix}$$

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Out[8]= {{2690.95, 0, 0, 0, 0, 0, 0, 0}, {0, 1914.46, 0, 0, 0, 0, 0, 0}, {0, 0, 3566.25, 0, 0, 0, 0, 0}, {0, 0, 0, 4166.89, 0, 0, 0, 0}, {0, 0, 0, 0, 2638.08, 0, 0, 0}, {0, 0, 0, 0, 0, 4010.89, 0, 0}, {0, 0, 0, 0, 0, 0, 4731.05, 0}, {0, 0, 0, 0, 0, 0, 0, 6721.23}}
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HPGe Correlation matrix

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In[9]:= MatrixForm[Out[8].Out[7].Out[8]]
Out[9]/MatrixForm=
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$$\begin{pmatrix} 1. & 0.446795 & 0.623498 & 0.690603 & 0.206309 & 0.260328 & 0.254158 & 0.28735 \\ 0.446795 & 0.999935 & 0.330062 & 0.365585 & 0.109214 & 0.13781 & 0.134544 & 0.152115 \\ 0.623498 & 0.330062 & 1.00034 & 0.51017 & 0.152407 & 0.192312 & 0.187755 & 0.212274 \\ 0.690603 & 0.365585 & 0.51017 & 1.0002 & 0.16881 & 0.21301 & 0.207962 & 0.23512 \\ 0.206309 & 0.109214 & 0.152407 & 0.16881 & 0.999798 & 0.063634 & 0.062126 & 0.0702392 \\ 0.260328 & 0.13781 & 0.192312 & 0.21301 & 0.063634 & 1.00011 & 0.0783929 & 0.0886304 \\ 0.254158 & 0.134544 & 0.187755 & 0.207962 & 0.062126 & 0.0783929 & 0.999716 & 0.08653 \\ 0.28735 & 0.152115 & 0.212274 & 0.23512 & 0.0702392 & 0.0886304 & 0.08653 & 1.00024 \end{pmatrix}$$

Method for the calculation of the efficiencies of the product nuclei gamma rays

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In[10]:= Dig =
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$$\begin{pmatrix} 42.051 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 56.506 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 75.448 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 79.573 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 168.643 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 203.188 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 245.502 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 308.513 \end{pmatrix}$$

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Out[10]= {{42.051, 0, 0, 0, 0, 0, 0, 0}, {0, 56.506, 0, 0, 0, 0, 0, 0}, {0, 0, 75.448, 0, 0, 0, 0, 0}, {0, 0, 0, 79.573, 0, 0, 0, 0}, {0, 0, 0, 0, 168.643, 0, 0, 0}, {0, 0, 0, 0, 0, 203.188, 0, 0}, {0, 0, 0, 0, 0, 0, 245.502, 0}, {0, 0, 0, 0, 0, 0, 0, 308.513}}
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In[11]:= MatrixForm[In[10].Out[7].In[10]]
Out[11]/MatrixForm=
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$$\begin{pmatrix} 0.000244199 & 0.000206076 & 0.00020613 & 0.000206088 & 0.000206096 & 0.000206086 & 0.000206097 & 0.000206113 \\ 0.000206076 & 0.00071098 & 0.0002061 & 0.000206058 & 0.000206066 & 0.000206056 & 0.000206068 & 0.000206084 \\ 0.00020613 & 0.0002061 & 0.000447734 & 0.000206112 & 0.00020612 & 0.00020611 & 0.000206122 & 0.000206138 \\ 0.000206088 & 0.000206058 & 0.000206112 & 0.000364749 & 0.000206078 & 0.000206068 & 0.00020608 & 0.000206096 \\ 0.000206096 & 0.000206066 & 0.00020612 & 0.000206078 & 0.000408577 & 0.000206076 & 0.000206087 & 0.000206104 \\ 0.000206086 & 0.000206056 & 0.00020611 & 0.000206068 & 0.000206076 & 0.00256663 & 0.000206078 & 0.000206094 \\ 0.000206097 & 0.000206068 & 0.000206122 & 0.00020608 & 0.000206087 & 0.000206078 & 0.00269198 & 0.000206105 \\ 0.000206113 & 0.000206084 & 0.000206138 & 0.000206096 & 0.000206104 & 0.000206094 & 0.000206105 & 0.00210744 \end{pmatrix}$$

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In[12]:= Af7 =
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$$\begin{pmatrix} 1 & -2.105 & 4.433 & -9.334 & 19.653 & -41.381 & 87.128 \\ 1 & -1.407 & 1.981 & -2.789 & 3.927 & -5.528 & 7.782 \\ 1 & -1.066 & 1.137 & -1.212 & 1.292 & -1.378 & 1.4698 \\ 1 & -0.812 & 0.659 & -0.5354 & 0.4347 & -0.353 & 0.2866 \\ 1 & -0.249 & 0.0624 & -0.0156 & 0.003898 & -0.000974 & 0.000243 \\ 1 & -0.0365 & 0.00133 & -4.8955 & 0.00000179 & -0.000000655 & 2.4 \times 10^{-9} \\ 1 & 0.0823 & 0.00678 & 0.000559 & 0.0000461 & 0.00000379 & 3.13 \times 10^{-7} \\ 1 & 0.342 & 0.1171 & 0.040062 & 0.01371 & 0.004691 & 0.00161 \end{pmatrix}$$

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Out[12]= {{1, -2.105, 4.433, -9.334, 19.653, -41.381, 87.128}, {1, -1.407, 1.981, -2.789, 3.927, -5.528, 7.782}, {1, -1.066, 1.137, -1.212, 1.292, -1.378, 1.4698}, {1, -0.812, 0.659, -0.5354, 0.4347, -0.353, 0.2866}, {1, -0.249, 0.0624, -0.0156, 0.003898, -0.000974, 0.000243}, {1, -0.0365, 0.00133, -4.8955, 1.79 \times 10^{-9}, -6.55 \times 10^{-8}, 2.4 \times 10^{-9}}, {1, 0.0823, 0.00678, 0.000559, 0.0000461, 3.79 \times 10^{-6}, 3.13 \times 10^{-7}}, {1, 0.342, 0.1171, 0.040062, 0.01371, 0.004691, 0.00161}}
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In[17]:= Z = 
$$\begin{pmatrix} -3.738 \\ -4.034 \\ -4.323 \\ -4.376 \\ -5.127 \\ -5.134 \\ -5.503 \\ -5.731 \end{pmatrix}$$


Out[17]= {{-3.738}, {-4.034}, {-4.323}, {-4.376}, {-5.127}, {-5.134}, {-5.503}, {-5.731}}

In[18]:= MatrixForm[Out[13].Out[14].Out[17]]
Out[18]/MatrixForm= 
$$\begin{pmatrix} -17208.7 \\ 18936.6 \\ -30971. \\ 58849.3 \\ -107985. \\ 218069. \\ -449344. \end{pmatrix}$$


In[19]:= MatrixForm[Out[16].Out[18]]
Out[19]/MatrixForm= 
$$\begin{pmatrix} -5.45369 \\ -1.09231 \\ 1.78241 \\ -0.056722 \\ -5.5799 \\ -4.976 \\ -1.20816 \end{pmatrix}$$


In[20]:= MatrixForm[In[17] - In[12].Out[19]]
Out[20]/MatrixForm= 
$$\begin{pmatrix} -9.5425 \times 10^{-7} \\ 0.000493324 \\ -0.00100729 \\ 0.00106751 \\ -0.0402056 \\ -0.000222773 \\ 0.0288108 \\ -0.00839932 \end{pmatrix}$$


In[21]:= MatrixForm[Transpose[Out[20]]]
Out[21]/MatrixForm= 
$$\begin{pmatrix} -9.5425 \times 10^{-7} & 0.000493324 & -0.00100729 & 0.00106751 & -0.0402056 & -0.000222773 & 0.0288108 & -0.00839932 \end{pmatrix}$$


In[22]:= MatrixForm[Out[21].Out[14].Out[20]]
Out[22]/MatrixForm= 
$$\begin{pmatrix} 0.799437 \end{pmatrix}$$


New matrix for Efficiency

In[23]:= Ac = 
$$\begin{pmatrix} 1 & 0.15811 & 0.0251 & 0.003952 & 0.000625 & 0.000098822 & 0.000015625 \\ 1 & -0.57248 & 0.32774 & -0.18762 & 0.107415 & -0.06149 & 0.03521 \\ 1 & 0.31381 & 0.09847 & 0.03091 & 0.009697 & 0.00304288 & 0.0009548 \end{pmatrix}$$


Out[23]= {{1, 0.15811, 0.0251, 0.003952, 0.000625, 0.000098822, 0.000015625}, {1, -0.57248, 0.32774, -0.18762, 0.107415, -0.06149, 0.03521}, {1, 0.31381, 0.09847, 0.03091, 0.009697, 0.00304288, 0.0009548}}

In[24]:= MatrixForm[Transpose[In[23]]]
Out[24]/MatrixForm= 
$$\begin{pmatrix} 1 & 1 & 1 \\ 0.15811 & -0.57248 & 0.31381 \\ 0.0251 & 0.32774 & 0.09847 \\ 0.003952 & -0.18762 & 0.03091 \\ 0.000625 & 0.107415 & 0.009697 \\ 0.000098822 & -0.06149 & 0.00304288 \\ 0.000015625 & 0.03521 & 0.0009548 \end{pmatrix}$$


In[25]:= MatrixForm[Out[23].Out[16].Out[24]]
Out[25]/MatrixForm= 
$$\begin{pmatrix} 0.0012533 & 0.000472945 & 0.000940042 \\ 0.000472945 & 0.000766935 & 0.000120364 \\ 0.000940042 & 0.000120364 & 0.00170022 \end{pmatrix}$$


In[26]:= effc = 
$$\begin{pmatrix} 0.003749 & 0 & 0 \\ 0 & 0.010791 & 0 \\ 0 & 0 & 0.0033691 \end{pmatrix}$$


Out[26]= {{0.003749, 0, 0}, {0, 0.010791, 0}, {0, 0, 0.0033691}}
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In[27]:= MatrixForm[Out[26].Out[25].Out[26]]
Out[27]//MatrixForm=

$$\begin{pmatrix} 1.76152 \times 10^{-8} & 1.91332 \times 10^{-8} & 1.18734 \times 10^{-8} \\ 1.91332 \times 10^{-8} & 8.93063 \times 10^{-8} & 4.37596 \times 10^{-9} \\ 1.18734 \times 10^{-8} & 4.37596 \times 10^{-9} & 1.92989 \times 10^{-8} \end{pmatrix}$$


In[28]:= Sqv =  $\begin{pmatrix} 7537.7836 & 0 & 0 \\ 0 & 3346.372 & 0 \\ 0 & 0 & 7216.878 \end{pmatrix}$ 
Out[28]= {{7537.78, 0, 0}, {0, 3346.37, 0}, {0, 0, 7216.88}}

In[29]:= MatrixForm[Out[28].Out[27].Out[28]]
Out[29]//MatrixForm=

$$\begin{pmatrix} 1.00086 & 0.482621 & 0.645907 \\ 0.482621 & 1.00007 & 0.105681 \\ 0.645907 & 0.105681 & 1.00515 \end{pmatrix}$$


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Cross section measurements partial uncertainties

$$\text{In}[1]:= \text{Cu} = \begin{pmatrix} 0.071820494 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.011521869 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.084064646 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.055571033 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.046274674 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.066848808 \end{pmatrix}$$

Out[1]= {{0.0718205, 0, 0, 0, 0, 0}, {0, 0.0115219, 0, 0, 0, 0}, {0, 0, 0.0840646, 0, 0, 0},
{0, 0, 0, 0.055571, 0, 0}, {0, 0, 0, 0, 0.0462747, 0}, {0, 0, 0, 0, 0, 0.0668488}}

In[2]:=

$$\text{Cm} = \begin{pmatrix} 0.031674679 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.035545758 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.052840635 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.036762375 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.057843343 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.049022459 \end{pmatrix}$$

Out[2]= {{0.0316747, 0, 0, 0, 0, 0}, {0, 0.0355458, 0, 0, 0, 0}, {0, 0, 0.0528406, 0, 0, 0},
{0, 0, 0, 0.0367624, 0, 0}, {0, 0, 0, 0, 0.0578433, 0}, {0, 0, 0, 0, 0, 0.0490225}}

In[3]:=

$$\text{AMu} = \begin{pmatrix} 0.000194792 & 0 & 0 & 0 & 0 & 0 \\ 0 & 5.78445 \times 10^{-5} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.000195429 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.000459633 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.000191371 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.000368608 \end{pmatrix}$$

Out[3]= {{0.000194792, 0, 0, 0, 0, 0}, {0, 0.0000578445, 0, 0, 0, 0}, {0, 0, 0.000195429, 0, 0, 0},
{0, 0, 0, 0.000459633, 0, 0}, {0, 0, 0, 0, 0.000191371, 0}, {0, 0, 0, 0, 0, 0.000368608}}

In[4]:=

$$\text{AMm} = \begin{pmatrix} 0.002661891 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.000790462 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.002670598 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.003089454 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.001286313 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.002477625 \end{pmatrix}$$

Out[4]= {{0.00266189, 0, 0, 0, 0, 0}, {0, 0.000790462, 0, 0, 0, 0}, {0, 0, 0.0026706, 0, 0, 0},
{0, 0, 0, 0.00308945, 0, 0}, {0, 0, 0, 0, 0.00128631, 0}, {0, 0, 0, 0, 0, 0.00247763}}

In[5]:=

$$\text{Wu} = \begin{pmatrix} 0.047959997 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.028436606 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.036027705 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.055663497 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.046274674 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.033424404 \end{pmatrix}$$

Out[5]= {{0.04796, 0, 0, 0, 0, 0}, {0, 0.0284366, 0, 0, 0, 0}, {0, 0, 0.0360277, 0, 0, 0},
{0, 0, 0, 0.0556635, 0, 0}, {0, 0, 0, 0, 0.0462747, 0}, {0, 0, 0, 0, 0, 0.0334244}}

In[6]:=

$$Wm = \begin{pmatrix} 0.047880329 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.017772879 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.060046176 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.041678275 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.023137337 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.05570734 \end{pmatrix}$$

Out[6]= {{0.0478803, 0, 0, 0, 0, 0}, {0, 0.0177729, 0, 0, 0, 0}, {0, 0, 0.0600462, 0, 0, 0},
{0, 0, 0, 0.0416783, 0, 0}, {0, 0, 0, 0, 0.0231373, 0}, {0, 0, 0, 0, 0, 0.0557073}}

In[7]:=

$$Igu = \begin{pmatrix} 0.004301642 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.001277394 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.004315713 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.002500696 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.00104118 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.002005464 \end{pmatrix}$$

Out[7]= {{0.00430164, 0, 0, 0, 0, 0}, {0, 0.00127739, 0, 0, 0, 0}, {0, 0, 0.00431571, 0, 0, 0},
{0, 0, 0, 0.0025007, 0, 0}, {0, 0, 0, 0, 0.00104118, 0}, {0, 0, 0, 0, 0, 0.00200546}}

In[8]:=

$$Igm = \begin{pmatrix} 0.000957607 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.000284366 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.000960739 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.001111421 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.000462747 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.000891317 \end{pmatrix}$$

Out[8]= {{0.000957607, 0, 0, 0, 0, 0}, {0, 0.000284366, 0, 0, 0, 0}, {0, 0, 0.000960739, 0, 0, 0},
{0, 0, 0, 0.00111142, 0, 0}, {0, 0, 0, 0, 0.000462747, 0}, {0, 0, 0, 0, 0, 0.000891317}}

In[9]:=

$$Abuu = \begin{pmatrix} 0.001191693 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.000353879 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.001195591 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.001389033 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.000578332 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.001113952 \end{pmatrix}$$

Out[9]= {{0.00119169, 0, 0, 0, 0, 0}, {0, 0.000353879, 0, 0, 0, 0}, {0, 0, 0.00119559, 0, 0, 0},
{0, 0, 0, 0.00138903, 0, 0}, {0, 0, 0, 0, 0.000578332, 0}, {0, 0, 0, 0, 0, 0.00111395}}

In[10]:=

$$SigM = \begin{pmatrix} 0.080830447 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.021355835 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.096073881 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.093813713 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.034752188 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.089131744 \end{pmatrix}$$

Out[10]= {{0.0808304, 0, 0, 0, 0, 0}, {0, 0.0213558, 0, 0, 0, 0}, {0, 0, 0.0960739, 0, 0, 0},
{0, 0, 0, 0.0938137, 0, 0}, {0, 0, 0, 0, 0.0347522, 0}, {0, 0, 0, 0, 0, 0.0891317}}

In[11]:=

$$\text{GattU} = \begin{pmatrix} 0.025592134 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.009119643 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.030810972 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.029691823 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.014834826 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.028574029 \end{pmatrix}$$

Out[11]= {{0.0255921, 0, 0, 0, 0, 0}, {0, 0.00911964, 0, 0, 0, 0}, {0, 0, 0.030811, 0, 0, 0},
{0, 0, 0, 0.0296918, 0, 0}, {0, 0, 0, 0, 0.0148348, 0}, {0, 0, 0, 0, 0, 0.028574}}

In[12]:=

$$\text{GattM} = \begin{pmatrix} 0.030901855 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.007647041 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.022735454 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.035869048 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.012445231 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.023012469 \end{pmatrix}$$

Out[12]= {{0.0309019, 0, 0, 0, 0, 0}, {0, 0.00764704, 0, 0, 0, 0}, {0, 0, 0.0227355, 0, 0, 0},
{0, 0, 0, 0.035869, 0, 0}, {0, 0, 0, 0, 0.0124452, 0}, {0, 0, 0, 0, 0, 0.0230125}}

$$\text{In[13]:= Areau} = \begin{pmatrix} 0.036277315 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.010772716 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.036395928 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.042108565 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.017532134 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.033769437 \end{pmatrix}$$

Out[13]= {{0.0362773, 0, 0, 0, 0, 0}, {0, 0.0107727, 0, 0, 0, 0}, {0, 0, 0.0363959, 0, 0, 0},
{0, 0, 0, 0.0421086, 0, 0}, {0, 0, 0, 0, 0.0175321, 0}, {0, 0, 0, 0, 0, 0.0337694}}

$$\text{In[14]:= Aream} = \begin{pmatrix} 0.020601237 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.006117632 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.020668595 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.023912699 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.009956185 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.019177058 \end{pmatrix}$$

Out[14]= {{0.0206012, 0, 0, 0, 0, 0}, {0, 0.00611763, 0, 0, 0, 0}, {0, 0, 0.0206686, 0, 0, 0},
{0, 0, 0, 0.0239127, 0, 0}, {0, 0, 0, 0, 0.00995619, 0}, {0, 0, 0, 0, 0, 0.0191771}}

$$\text{In[15]:= Effeu} = \begin{pmatrix} 0.043574544 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.014218303 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.048036941 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.061775565 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.034706006 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.044565872 \end{pmatrix}$$

Out[15]= {{0.0435745, 0, 0, 0, 0, 0}, {0, 0.0142183, 0, 0, 0, 0}, {0, 0, 0.0480369, 0, 0, 0},
{0, 0, 0, 0.0617756, 0, 0}, {0, 0, 0, 0, 0.034706, 0}, {0, 0, 0, 0, 0, 0.0445659}}

$$\text{In[16]:= Effem} = \begin{pmatrix} 0.071820494 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.021327455 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.072055411 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.083356549 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.028921671 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.066848808 \end{pmatrix}$$

Out[16]= {{0.0718205, 0, 0, 0, 0, 0}, {0, 0.0213275, 0, 0, 0, 0}, {0, 0, 0.0720554, 0, 0, 0},
{0, 0, 0, 0.0833565, 0, 0}, {0, 0, 0, 0, 0.0289217, 0}, {0, 0, 0, 0, 0, 0.0668488}}

In[17]:=

$$\text{LamU} = \begin{pmatrix} 0.016305336 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.004881635 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.015771217 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.014062374 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.005953096 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.015279167 \end{pmatrix}$$

Out[17]= {{0.0163053, 0, 0, 0, 0, 0}, {0, 0.00488164, 0, 0, 0, 0}, {0, 0, 0.0157712, 0, 0, 0},
{0, 0, 0, 0.0140624, 0, 0}, {0, 0, 0, 0, 0.0059531, 0}, {0, 0, 0, 0, 0, 0.0152792}}

In[18]:=

$$\text{LamM} = \begin{pmatrix} 0.001048538 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.00040964 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0.001891894 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0.001216958 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.0006666 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.001831 \end{pmatrix}$$

Out[18]= {{0.00104854, 0, 0, 0, 0, 0}, {0, 0.00040964, 0, 0, 0, 0}, {0, 0, 0.00189189, 0, 0, 0},
{0, 0, 0, 0.00121696, 0, 0}, {0, 0, 0, 0, 0.0006666, 0}, {0, 0, 0, 0, 0, 0.001831}}

Cross section micro-correlation matrix

In[19]:=

$$\text{MCu} = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

Out[19]= {{1, 0, 0, 0, 0, 0}, {0, 1, 0, 0, 0, 0}, {0, 0, 1, 0, 0, 0},
{0, 0, 0, 1, 0, 0}, {0, 0, 0, 0, 1, 0}, {0, 0, 0, 0, 0, 1}}

$$\text{In[20]:= MCm} = \begin{pmatrix} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 \end{pmatrix}$$

Out[20]= {{1, 0, 0, 1, 0, 0}, {0, 1, 0, 0, 1, 0}, {0, 0, 1, 0, 0, 1},
{1, 0, 0, 1, 0, 0}, {0, 1, 0, 0, 1, 0}, {0, 0, 1, 0, 0, 1}}

$$\text{In[21]:= MAWu} = \begin{pmatrix} 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 \end{pmatrix}$$

Out[21]= {{1, 1, 1, 0, 0, 0}, {1, 1, 1, 0, 0, 0}, {1, 1, 1, 0, 0, 0},
{0, 0, 0, 1, 1, 1}, {0, 0, 0, 1, 1, 1}, {0, 0, 0, 1, 1, 1}}

$$\text{In[22]:= MAWm} = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \end{pmatrix}$$

Out[22]= {{1, 1, 1, 1, 1, 1}, {1, 1, 1, 1, 1, 1}, {1, 1, 1, 1, 1, 1},
{1, 1, 1, 1, 1, 1}, {1, 1, 1, 1, 1, 1}, {1, 1, 1, 1, 1, 1}}

$$\text{In[23]:= Mwtu} = \begin{pmatrix} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 \end{pmatrix}$$

$$\text{Out[23]= } \{ \{1, 0, 0, 1, 0, 0\}, \{0, 1, 0, 0, 1, 0\}, \{0, 0, 1, 0, 0, 1\}, \\ \{1, 0, 0, 1, 0, 0\}, \{0, 1, 0, 0, 1, 0\}, \{0, 0, 1, 0, 0, 1\} \}$$

$$\text{In[24]:= Mwtm} = \begin{pmatrix} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 & 1 & 1 \end{pmatrix}$$

$$\text{Out[24]= } \{ \{1, 0, 0, 1, 0, 0\}, \{0, 1, 1, 0, 1, 1\}, \{0, 1, 1, 0, 1, 1\}, \\ \{1, 0, 0, 1, 0, 0\}, \{0, 1, 1, 0, 1, 1\}, \{0, 1, 1, 0, 1, 1\} \}$$

$$\text{In[25]:=}$$

$$\text{MIgu} = \begin{pmatrix} 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 \end{pmatrix}$$

$$\text{Out[25]= } \{ \{1, 1, 1, 0, 0, 0\}, \{1, 1, 1, 0, 0, 0\}, \{1, 1, 1, 0, 0, 0\}, \\ \{0, 0, 0, 1, 1, 1\}, \{0, 0, 0, 1, 1, 1\}, \{0, 0, 0, 1, 1, 1\} \}$$

$$\text{In[26]:=}$$

$$\text{MIgm} = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \end{pmatrix}$$

$$\text{Out[26]= } \{ \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \\ \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\} \}$$

$$\text{In[27]:= Mabnu} = \begin{pmatrix} 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 \end{pmatrix}$$

$$\text{Out[27]= } \{ \{1, 1, 1, 0, 0, 0\}, \{1, 1, 1, 0, 0, 0\}, \{1, 1, 1, 0, 0, 0\}, \\ \{0, 0, 0, 1, 1, 1\}, \{0, 0, 0, 1, 1, 1\}, \{0, 0, 0, 1, 1, 1\} \}$$

$$\text{In[28]:= Msigm} = \begin{pmatrix} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 \end{pmatrix}$$

$$\text{Out[28]= } \{ \{1, 0, 0, 1, 0, 0\}, \{0, 1, 0, 0, 1, 0\}, \{0, 0, 1, 0, 0, 1\}, \\ \{1, 0, 0, 1, 0, 0\}, \{0, 1, 0, 0, 1, 0\}, \{0, 0, 1, 0, 0, 1\} \}$$

$$\text{In[29]:= Mgattnu} = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

$$\text{Out[29]= } \{ \{1, 0, 0, 0, 0, 0\}, \{0, 1, 0, 0, 0, 0\}, \{0, 0, 1, 0, 0, 0\}, \\ \{0, 0, 0, 1, 0, 0\}, \{0, 0, 0, 0, 1, 0\}, \{0, 0, 0, 0, 0, 1\} \}$$

$$\text{In[30]:= Mgattnm} = \begin{pmatrix} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 & 1 & 1 \end{pmatrix}$$

$$\text{Out[30]= } \{ \{1, 0, 0, 1, 0, 0\}, \{0, 1, 1, 0, 1, 1\}, \{0, 1, 1, 0, 1, 1\}, \\ \{1, 0, 0, 1, 0, 0\}, \{0, 1, 1, 0, 1, 1\}, \{0, 1, 1, 0, 1, 1\} \}$$

$$\text{In[31]:= Mareau} = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \end{pmatrix}$$

$$\text{Out[31]= } \{ \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \\ \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\} \}$$

$$\text{In[32]:= Maream} = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \end{pmatrix}$$

$$\text{Out[32]= } \{ \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \\ \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\} \}$$

$$\text{In[33]:= Meffu} = \begin{pmatrix} 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 \end{pmatrix}$$

$$\text{Out[33]= } \{ \{1, 1, 1, 0, 0, 0\}, \{1, 1, 1, 0, 0, 0\}, \{1, 1, 1, 0, 0, 0\}, \\ \{0, 0, 0, 1, 1, 1\}, \{0, 0, 0, 1, 1, 1\}, \{0, 0, 0, 1, 1, 1\} \}$$

$$\text{In[34]:= Meffm} = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \end{pmatrix}$$

$$\text{Out[34]= } \{ \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \\ \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\} \}$$

$$\text{In[35]:= Mlau} = \begin{pmatrix} 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 \end{pmatrix}$$

$$\text{Out[35]= } \{ \{1, 1, 1, 0, 0, 0\}, \{1, 1, 1, 0, 0, 0\}, \{1, 1, 1, 0, 0, 0\}, \\ \{0, 0, 0, 1, 1, 1\}, \{0, 0, 0, 1, 1, 1\}, \{0, 0, 0, 1, 1, 1\} \}$$

$$\text{In[36]:= Mlam} = \begin{pmatrix} 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \end{pmatrix}$$

$$\text{Out[36]= } \{ \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \\ \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\}, \{1, 1, 1, 1, 1, 1\} \}$$

Cross section covariance matrix

$$\text{In[37]:= MatrixForm[In[1].In[19].In[1] + In[2].In[20].In[2] + In[3].In[21].In[3] +} \\ \text{In[4].In[22].In[4] + In[5].In[23].In[5] + In[6].In[24].In[6] +} \\ \text{In[7].In[25].In[7] + In[8].In[26].In[8] + In[9].In[27].In[9] +} \\ \text{In[10].In[28].In[10] + In[11].In[29].In[11] + In[12].In[30].In[12] +} \\ \text{In[13].In[31].In[13] + In[14].In[32].In[14] + In[15].In[33].In[15] +} \\ \text{In[16].In[34].In[16] + In[17].In[35].In[17] + In[18].In[36].In[18]]}$$

$$\text{Out[37]//MatrixForm=}$$

$$\begin{pmatrix} 0.0279899 & 0.00275647 & 0.00930158 & 0.0225385 & 0.00292286 & 0.00643062 \\ 0.00275647 & 0.00395545 & 0.00406544 & 0.00238095 & 0.00548855 & 0.00307584 \\ 0.00930158 & 0.00406544 & 0.0349908 & 0.00804473 & 0.00460524 & 0.0226792 \\ 0.0225385 & 0.00238095 & 0.00804473 & 0.0335722 & 0.00562364 & 0.0104384 \\ 0.00292286 & 0.00548855 & 0.00460524 & 0.00562364 & 0.0122332 & 0.00593696 \\ 0.00643062 & 0.00307584 & 0.0226792 & 0.0104384 & 0.00593696 & 0.0285951 \end{pmatrix}$$

$$\text{In[38]:=}$$

$$\text{Cor1} = \begin{pmatrix} 5.97821 & 0 & 0 & 0 & 0 & 0 \\ 0 & 15.901 & 0 & 0 & 0 & 0 \\ 0 & 0 & 5.3459 & 0 & 0 & 0 \\ 0 & 0 & 0 & 5.45771 & 0 & 0 \\ 0 & 0 & 0 & 0 & 9.04128 & 0 \\ 0 & 0 & 0 & 0 & 0 & 5.91352 \end{pmatrix}$$

$$\text{Out[38]= } \{ \{5.97821, 0, 0, 0, 0, 0\}, \{0, 15.901, 0, 0, 0, 0\}, \{0, 0, 5.3459, 0, 0, 0\}, \\ \{0, 0, 0, 5.45771, 0, 0\}, \{0, 0, 0, 0, 9.04128, 0\}, \{0, 0, 0, 0, 0, 5.91352\} \}$$

Cross section correlation matrix

$$\text{In[39]:= MatrixForm[Out[38].Out[37].Out[38]]}$$

$$\text{Out[39]//MatrixForm=}$$

$$\begin{pmatrix} 1.00033 & 0.262029 & 0.297268 & 0.735373 & 0.157983 & 0.227337 \\ 0.262029 & 1.0001 & 0.345583 & 0.206626 & 0.789064 & 0.289224 \\ 0.297268 & 0.345583 & 0.999989 & 0.234716 & 0.222589 & 0.71696 \\ 0.735373 & 0.206626 & 0.234716 & 1. & 0.277497 & 0.336892 \\ 0.157983 & 0.789064 & 0.222589 & 0.277497 & 1. & 0.317424 \\ 0.227337 & 0.289224 & 0.71696 & 0.336892 & 0.317424 & 0.999964 \end{pmatrix}$$