

$$\begin{aligned}
\int_{\mathcal{F}} d\mu \, \Gamma_{2,2}(T, U) \frac{\hat{E}_2 E_4 E_6}{\Delta} \simeq & \operatorname{Re} \left[-24 \sum_{k>0} \left(11 \operatorname{Li}_1(e^{2\pi i k T}) - \frac{30}{\pi T_2 U_2} \mathcal{P}(kT) \right) \right. \\
& - 24 \sum_{\ell>0} \left(11 \operatorname{Li}_1(e^{2\pi i \ell U}) - \frac{30}{\pi T_2 U_2} \mathcal{P}(\ell U) \right) \\
& + \sum_{k>0, \ell>0} \left(\tilde{c}(k\ell) \operatorname{Li}_1(e^{2\pi i(kT+\ell U)}) - \frac{3c(k\ell)}{\pi T_2 U_2} \mathcal{P}(kT + \ell U) \right) \\
& \left. + \operatorname{Li}_1(e^{2\pi i(T_1-U_1+i|T_2-U_2|)}) - \frac{3}{\pi T_2 U_2} \mathcal{P}(T_1 - U_1 + i|T_2 - U_2|) \right) \\
& + \frac{60 \zeta(3)}{\pi^2 T_2 U_2} + 22 \log \left(\frac{8\pi e^{1-\gamma}}{\sqrt{27}} T_2 U_2 \right) \\
& + \left(\frac{4\pi}{3} \frac{U_2^2}{T_2} - \frac{22\pi}{3} U_2 - 4\pi T_2 \right) \Theta(T_2 - U_2) \\
& + \left(\frac{4\pi}{3} \frac{T_2^2}{U_2} - \frac{22\pi}{3} T_2 - 4\pi U_2 \right) \Theta(U_2 - T_2)
\end{aligned}$$