

$$N = 291 = 3 \cdot 97$$

By the Ibukiyama-Kitayama dimension formula,
 $\dim(S_4(K(291))) = 188$

By the Skoruppa-Zagier dimension formula and Jacobi restriction,
the lift dimension of $S_4(K(291))^+$ is 55
the nonlift dimension of $S_4(K(291))^+$ is heuristically 106
 $\dim(S_4(K(291))^+)$ thus is heuristically 161
 $\dim(S_4(K(291))^-)$ is heuristically 27

$\dim(J_{\{2,291\}}^{\{\text{cusp}\}}) = 8$ (Skoruppa-Zagier), so need to span to within 7 dimensions

$q = 5$ for TraceDown

After TD($\text{Grit}(J_{\{4,1455\}}^{\{\text{cusp}\}})$) and $(\text{Grit}(J_{\{2,291\}}^{\{\text{cusp}\}}))^2$,
spanned rank in $S_4(K(291))^+$ is 161
spanned rank in $S_4(K(291))^-$ is 0

Hecke operators applied: $\{\{3, 2\}\}$

After Hecke spreading,
spanned rank in $S_4(K(291))^-$ is 13

After Borcherds products,
spanned rank in $S_4(K(291))^-$ is 20

Final spanned rank in $S_4(K(291))^+$ is 161

Final spanned rank in $S_4(K(291))^-$ is 20

 $S_2(K(291))^+$ is determined by Jacobi restriction and the $H4Ndl(4,+)$ test
($\dim(H_4(291,4,1))^+ \leq 7$ and this is less than $\dim(J_{\{2,291\}}^{\{\text{cusp}\}})+1 = 9$)
 $S_2(K(291))^- = 0$ by Jacobi restriction and the $H4Ndl(1,-)$ test
($\dim(H_4(291,1,1))^- \leq 7$ and this is less than $\dim(J_{\{2,291\}}^{\{\text{cusp}\}}) = 8$)

So $S_2(K(291)) = \text{Grit}(J_{\{2,291\}}^{\{\text{cusp}\}})$ (dimension 8)