The results are:

	$T_1 \cdot T_2$	$A_H$	$\delta a_2  2\pi^2 (\pi^2 - 12)$	
$N\overline{N} \to 1$	$-\frac{N^2-1}{2N}$	$\frac{1}{8}(N-1)N(N+1)$	0	
$N\overline{N} o { m adj}$	$\frac{1}{2N}$	$\frac{1}{8}N$	$N^2\pi^2(\pi^2-12)$	
NN  o a	$-\frac{N+1}{2N}$	$\frac{1}{4}(N+1)$	$\frac{1}{2}N(N-2)\pi^2(\pi^2-12)$	
NN  o s	$\frac{N-1}{2N}$	$\frac{1}{4}(N-1)$	$\frac{1}{2}N(N+2)\pi^2(\pi^2-12)$	
$adj \otimes adj \rightarrow 1$	-N	$rac{1}{4}N^3$	0	
$\operatorname{adj} \otimes \operatorname{adj}  o \operatorname{adj}_S$	$-\frac{N}{2}$	$\frac{1}{8}N^3$	0	(8.8)
$\operatorname{adj} \otimes \operatorname{adj} \to \operatorname{adj}_A$	$-\frac{N}{2}$	$\frac{1}{8}N(N^2+12)$	$-6\pi^2(\pi^2-12)$	(0.0)
$\operatorname{adj} \otimes \operatorname{adj} \to \bar{a}s + \bar{s}a$		$\frac{1}{4}N$	$V_H = -\frac{3}{2}N\pi^2(\pi^2 - 12)$	
$\operatorname{adj} \otimes \operatorname{adj}  o ar{a}a$	-1	$\frac{3}{4}N-\frac{1}{2}$	$\frac{1}{2}(N-1)(N-2)\pi^2(\pi^2-12)$	
$\operatorname{adj} \otimes \operatorname{adj} \to \bar{s}s$	1	$\frac{3}{4}N + \frac{1}{2}$	$\frac{1}{2}(N+1)(N+2)\pi^2(\pi^2-12)$	
$N\otimes \mathrm{adj}  o N$	$-\frac{N}{2}$	$\frac{1}{8}N(N^2+2)$	$-\pi^2(\pi^2-12)$	
$N \otimes \operatorname{adj}  o a ar{i}$	$-\frac{1}{2}$	$\frac{3}{8}N$	$\frac{1}{2}N(N-3)\pi^2(\pi^2-12)$	
$N \otimes \operatorname{adj}  o sar{i}$	$\frac{1}{2}$	$\frac{3}{8}N$	$\frac{1}{2}N(N+3)\pi^2(\pi^2-12)$	

## 9 H Graph

The H-graph in Coulomb gauge was computed in Ref. [7]. Their Eq. (2.8) is

$$V = -\frac{81}{128}\pi(12 - \pi^2)\frac{\alpha^3}{\mathbf{q}^2}$$
 (9.1)

{sec:coul

with  $\alpha = (4/3)\alpha_s$ .

$$V = \pi^{2}(\pi^{2} - 12) \left[ \frac{81}{128\pi} \left( \frac{4}{3} \right)^{3} 4\pi \right] \frac{4\pi\alpha_{s}}{\mathbf{q}^{2}} \left( \frac{\alpha_{s}}{4\pi} \right)^{2} = \pi^{2}(\pi^{2} - 12) \left[ 6 \right] \frac{4\pi\alpha_{s}}{\mathbf{q}^{2}} \left( \frac{\alpha_{s}}{4\pi} \right)^{2}$$
(9.2)

The QCD group theory factor for  $N\overline{N} \to 1$  is 3, from the table, so the Coulomb H-graph is  $2\pi^2(\pi^2 - 12)$  as expected in Eq. (8.7).

Summary: the graph

The results are:

	$T_1 \cdot T_2$	$A_H$	$\delta a_2  2\pi^2 (\pi^2 - 12)$	
$N\overline{N} \to 1$	$-\frac{N^2-1}{2N}$	$\frac{1}{8}(N-1)N(N+1)$	0	
$N\overline{N}  o \mathrm{adj}$	$\frac{1}{2N}$	$\frac{1}{8}N$	$N^2\pi^2(\pi^2-12)$	
$NN \to a$	$-\frac{N+1}{2N}$	$\frac{1}{4}(N+1)$	$\frac{1}{2}N(N-2)\pi^2(\pi^2-12)$	
$NN \to s$	$\frac{N-1}{2N}$	$\frac{1}{4}(N-1)$	$\frac{1}{2}N(N+2)\pi^2(\pi^2-12)$	
$\mathrm{adj}\otimes\mathrm{adj}\to 1$	-N	$rac{1}{4}N^3$	0	
$\mathrm{adj} \otimes \mathrm{adj} \to \mathrm{adj}_S$	$-\frac{N}{2}$	$rac{1}{8}N^3$	0	(0 0)
$\mathrm{adj}\otimes\mathrm{adj}\to\mathrm{adj}_A$	$-\frac{N}{2}$	$\frac{1}{8}N(N^2+12)$	$-6\pi^2(\pi^2-12)$	(8.8)
$adj \otimes adj \rightarrow \bar{a}s + \bar{s}a$	0	$\frac{3}{4}N$	$V_H = -\frac{3}{2}N\pi^2(\pi^2 - 12)$	
$\mathrm{adj}\otimes\mathrm{adj}\to\bar{a}a$	-1	$\frac{3}{4}N-\frac{1}{2}$	$\frac{1}{2}(N-1)(N-2)\pi^2(\pi^2-12)$	
$\mathrm{adj}\otimes\mathrm{adj}\to\bar{s}s$	1	$\frac{3}{4}N + \frac{1}{2}$	$\frac{1}{2}(N+1)(N+2)\pi^2(\pi^2-12)$	
$N \otimes \operatorname{adj} \to N$	$-\frac{N}{2}$	$\frac{1}{8}N(N^2+2)$	$-\pi^2(\pi^2-12)$	
$N \otimes \operatorname{adj} \to a\overline{i}$	$-\frac{1}{2}$	$\frac{3}{8}N$	$\frac{1}{2}N(N-3)\pi^2(\pi^2-12)$	
$N \otimes \operatorname{adj} \to s\bar{i}$	$\frac{1}{2}$	$\frac{3}{8}N$	$\frac{1}{2}N(N+3)\pi^2(\pi^2-12)$	

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The H-graph in Coulomb gauge was computed in Ref. [7]. Their Eq. (2.8) is

$$V = -\frac{81}{128}\pi(12 - \pi^2)\frac{\alpha^3}{\mathbf{q}^2} \tag{9.1}$$

{sec:coulomt

with  $\alpha = (4/3)\alpha_s$ .

$$V = \pi^{2}(\pi^{2} - 12) \left[ \frac{81}{128\pi} \left( \frac{4}{3} \right)^{3} 4\pi \right] \frac{4\pi\alpha_{s}}{\mathbf{q}^{2}} \left( \frac{\alpha_{s}}{4\pi} \right)^{2} = \pi^{2}(\pi^{2} - 12) \left[ 6 \right] \frac{4\pi\alpha_{s}}{\mathbf{q}^{2}} \left( \frac{\alpha_{s}}{4\pi} \right)^{2}$$
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The QCD group theory factor for  $N\overline{N} \to 1$  is 3, from the table, so the Coulomb H-graph is  $2\pi^2(\pi^2 - 12)$  as expected in Eq. (8.7).

Summary: the graph