$$\beta_1^{(\alpha_s\alpha)} = -2\,[i = 1]\,n_f \sum e_i^2$$

$$\beta_1^{(\alpha\alpha_s)} = -\frac{16}{3} N_c\,[i = 1]\,n_f \sum e_i^2$$

$$\beta_1^{(\alpha^2)} = -4(n_l + N_c\,[i = 1]\,n_f \sum e_i^2)$$