**TABLE IV**

| Lowest-order polarization insertion $\Pi^0$ |
| --- |

$$
\begin{aligned}
2\pi(\omega^2+4\Gamma^2)\mathrm{Re}\Pi^0_r(\omega) = {} & \Gamma_L\left[\ln\left(\frac{(\mu_L-E^0_r+\omega)^2+\Gamma^2}{(\mu_L-E^0_r)^2+\Gamma^2}\right)+\ln\left(\frac{(\mu_L-E^0_r-\omega)^2+\Gamma^2}{(\mu_L-E^0_r)^2+\Gamma^2}\right)\right] \\
& + \Gamma_R\left[\ln\left(\frac{(\mu_R-E^0_r+\omega)^2+\Gamma^2}{(\mu_R-E^0_r)^2+\Gamma^2}\right)+\ln\left(\frac{(\mu_R-E^0_r-\omega)^2+\Gamma^2}{(\mu_R-E^0_r)^2+\Gamma^2}\right)\right] \\
& - \frac{4\Gamma}{\omega}\Gamma_L\left[\arctan\left(\frac{\mu_L-E^0_r+\omega}{\Gamma}\right)-\arctan\left(\frac{\mu_L-E^0_r-\omega}{\Gamma}\right)\right] \\
& - \frac{4\Gamma}{\omega}\Gamma_R\left[\arctan\left(\frac{\mu_R-E^0_r+\omega}{\Gamma}\right)-\arctan\left(\frac{\mu_R-E^0_r-\omega}{\Gamma}\right)\right],
\end{aligned}
$$

$$
\begin{aligned}
-2\pi(\omega^2+4\Gamma^2)\mathrm{Im}\Pi^0_r(\omega) = {} & 2\Gamma_L\left[\arctan\left(\frac{\mu_L-E^0_r+\omega}{\Gamma}\right)-\arctan\left(\frac{\mu_L-E^0_r-\omega}{\Gamma}\right)\right] \\
& + 2\Gamma_R\left[\arctan\left(\frac{\mu_R-E^0_r+\omega}{\Gamma}\right)-\arctan\left(\frac{\mu_R-E^0_r-\omega}{\Gamma}\right)\right] \\
& + \frac{2\Gamma}{\omega}\Gamma_L\left[\ln\left(\frac{(\mu_L-E^0_r+\omega)^2+\Gamma^2}{(\mu_L-E^0_r)^2+\Gamma^2}\right)+\ln\left(\frac{(\mu_L-E^0_r-\omega)^2+\Gamma^2}{(\mu_L-E^0_r)^2+\Gamma^2}\right)\right] \\
& + \frac{2\Gamma}{\omega}\Gamma_R\left[\ln\left(\frac{(\mu_R-E^0_r+\omega)^2+\Gamma^2}{(\mu_R-E^0_r)^2+\Gamma^2}\right)+\ln\left(\frac{(\mu_R-E^0_r-\omega)^2+\Gamma^2}{(\mu_R-E^0_r)^2+\Gamma^2}\right)\right].
\end{aligned}
$$

Using:

$$\Gamma_{L/R}\equiv\Gamma_{L/R}(E^0_r),\qquad \Gamma=\Gamma_L+\Gamma_R.$$