

	photon chain	π^0 chain
$\omega_{\text{long}}(\theta_D^*, \theta_D)$	$\cos^2 \theta_D^* \sin^2 \theta_D$	$\cos^2 \theta_D^* \cos^2 \theta_D$
$\omega_{\text{tran}}(\chi, \theta_D^*, \theta_D)$	$\sin^2 \theta_D^* (\sin^2 \chi + \cos^2 \chi \cos^2 \theta_D)$	$\cos^2 \chi \sin^2 \theta_D^* \sin^2 \theta_D$
$\omega_{\text{int}}(\chi, \theta_D^*, \theta_D)$	$2 \cos \chi \sin \theta_D^* \cos \theta_D^* \sin \theta_D \cos \theta_D$	$-2 \cos \chi \sin \theta_D^* \cos \theta_D^* \sin \theta_D \cos \theta_D$