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A model for two-proton emission induced by electron scattering

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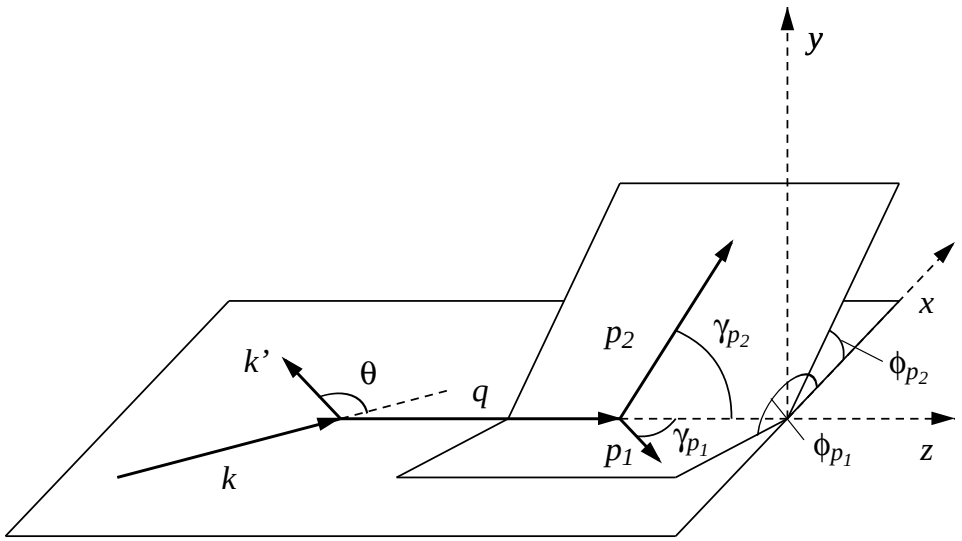
$$(e, e'2N)$$

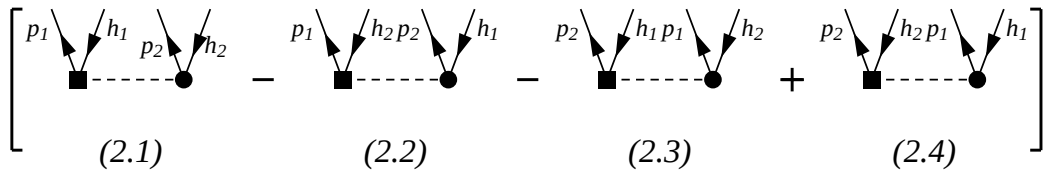


$$|\widetilde{\Psi}_n\rangle = \frac{|\Psi_n\rangle}{\langle\Psi_n|\Psi_n\rangle^{\frac{1}{2}}}\ , \quad |\Psi_n\rangle = F\,|\Phi_n\rangle\ , \quad F = \prod_{i<j} f(r_{ij})$$

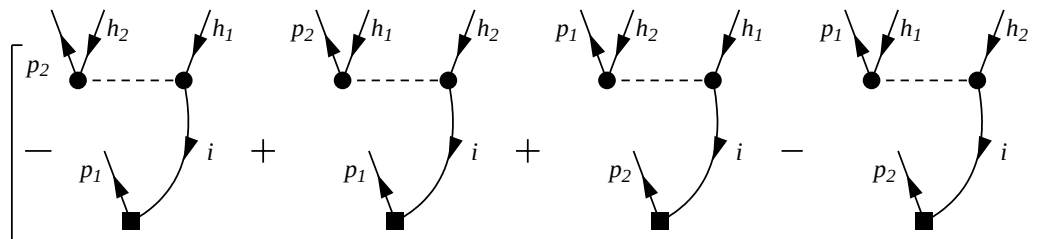
$$d\sigma \sim \sum_n |\langle\widetilde{\Psi}_n\,|\,O(\mathbf{q})\,|\,\widetilde{\Psi}_0\rangle|^2 \delta(E_n - E_0 - \omega + i)$$

$$\begin{aligned}
\xi_n(\mathbf{q}) &= \frac{\langle\Psi_n|\,O(\mathbf{q})\,|\Psi_0\rangle}{\langle\Psi_n|\Psi_n\rangle^{\frac{1}{2}}\,\langle\Psi_0|\Psi_0\rangle^{\frac{1}{2}}} \\
&= \frac{\langle\Phi_n|F^+O(\mathbf{q})F|\Phi_0\rangle}{\langle\Phi_n|F^+F|\Phi_n\rangle^{\frac{1}{2}}\langle\Phi_n|F^+F|\Phi_n\rangle^{\frac{1}{2}}} \\
&= \langle\Phi_n|O(\mathbf{q})F^2|\Phi_0\rangle_L = \langle\Phi_n|O(\mathbf{q})\prod_{i<j}^{A}(1+h_{ij})|\Phi_o\rangle_L
\end{aligned}$$

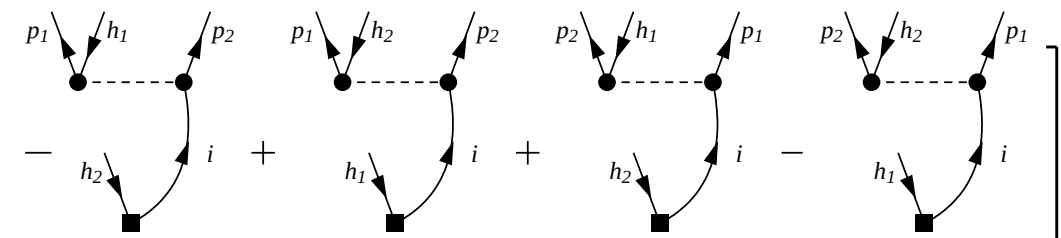
$$\begin{aligned}
\xi_n(\mathbf{q}) \longrightarrow \xi_n^1(\mathbf{q}) &= \langle\Phi_n|\,O(\mathbf{q})\,(1+\sum_{i<j} h_{ij})\,|\Phi_0\rangle_L \\
&= \langle\Phi_n(2p2h)|\,O(\mathbf{q})\sum_{1<j} h(r_{1,j})\,|\Phi_0\rangle_L \\
&+ \langle\Phi_n(2p2h)|\,O(\mathbf{q})\sum_{1<i<j} h(r_{i,j})\,|\Phi_0\rangle_L
\end{aligned}$$

$$\frac{1}{2}\Big[$$ 

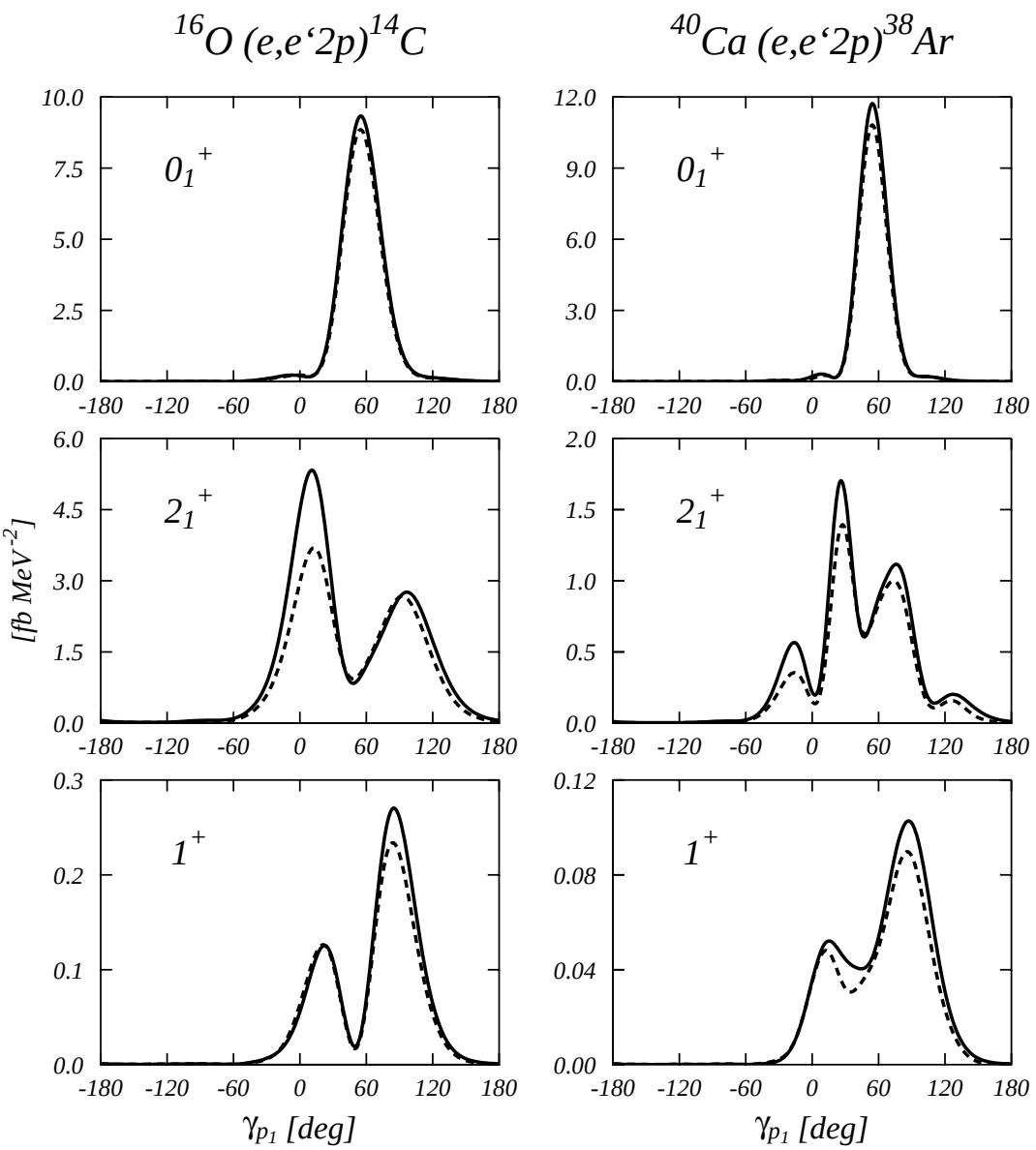
(2.1) *(2.2)* *(2.3)* *(2.4)*

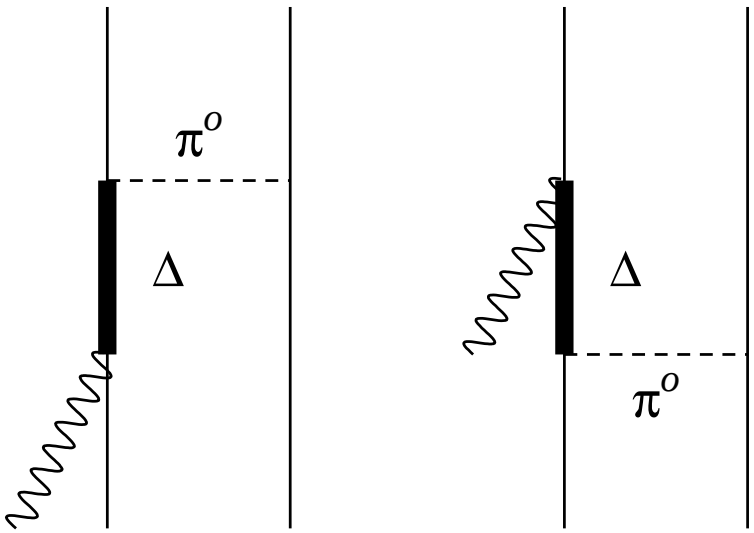
$$+\ \frac{1}{6}\Big[$$ 

(3.1) *(3.2)* *(3.3)* *(3.4)*

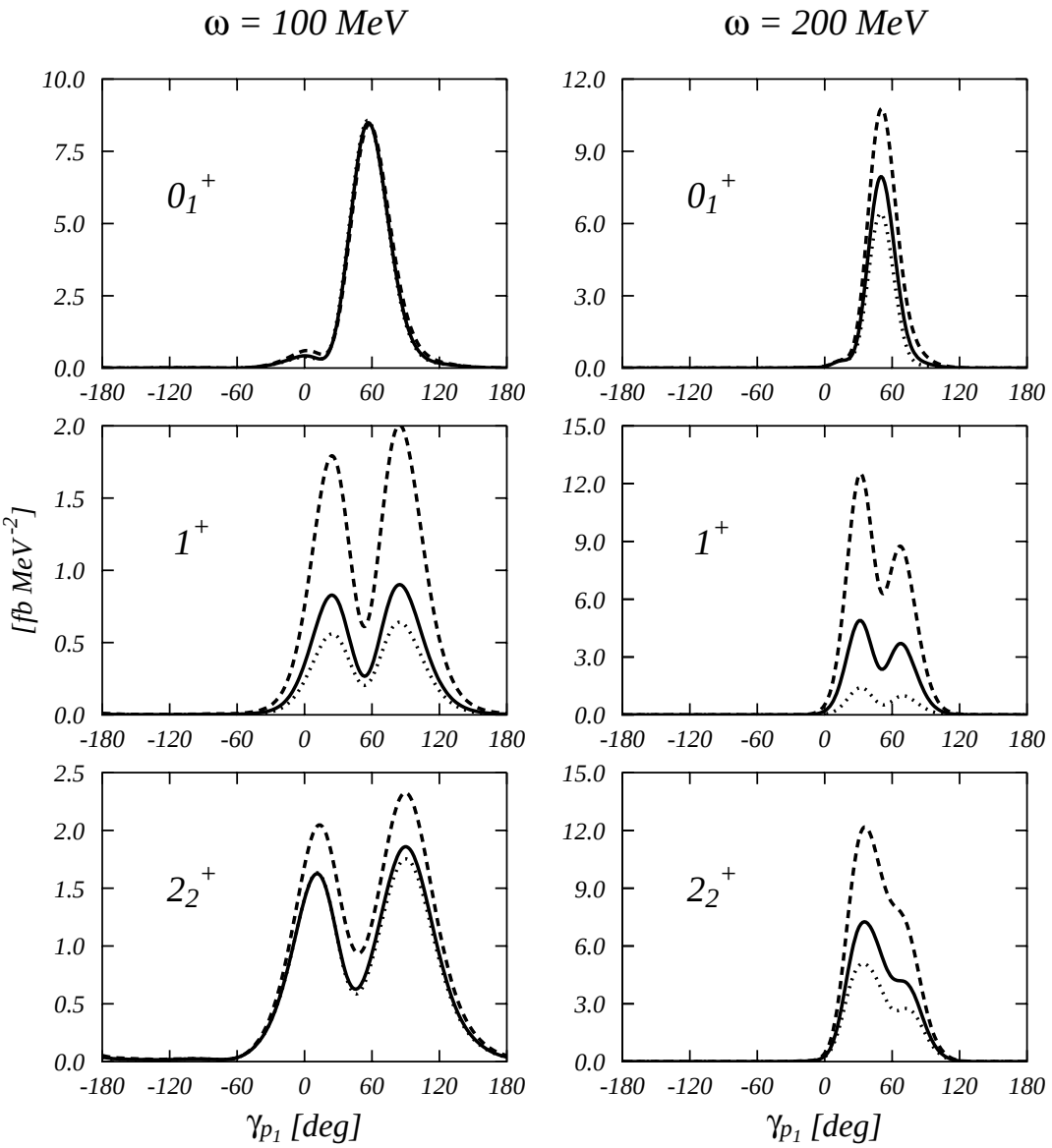


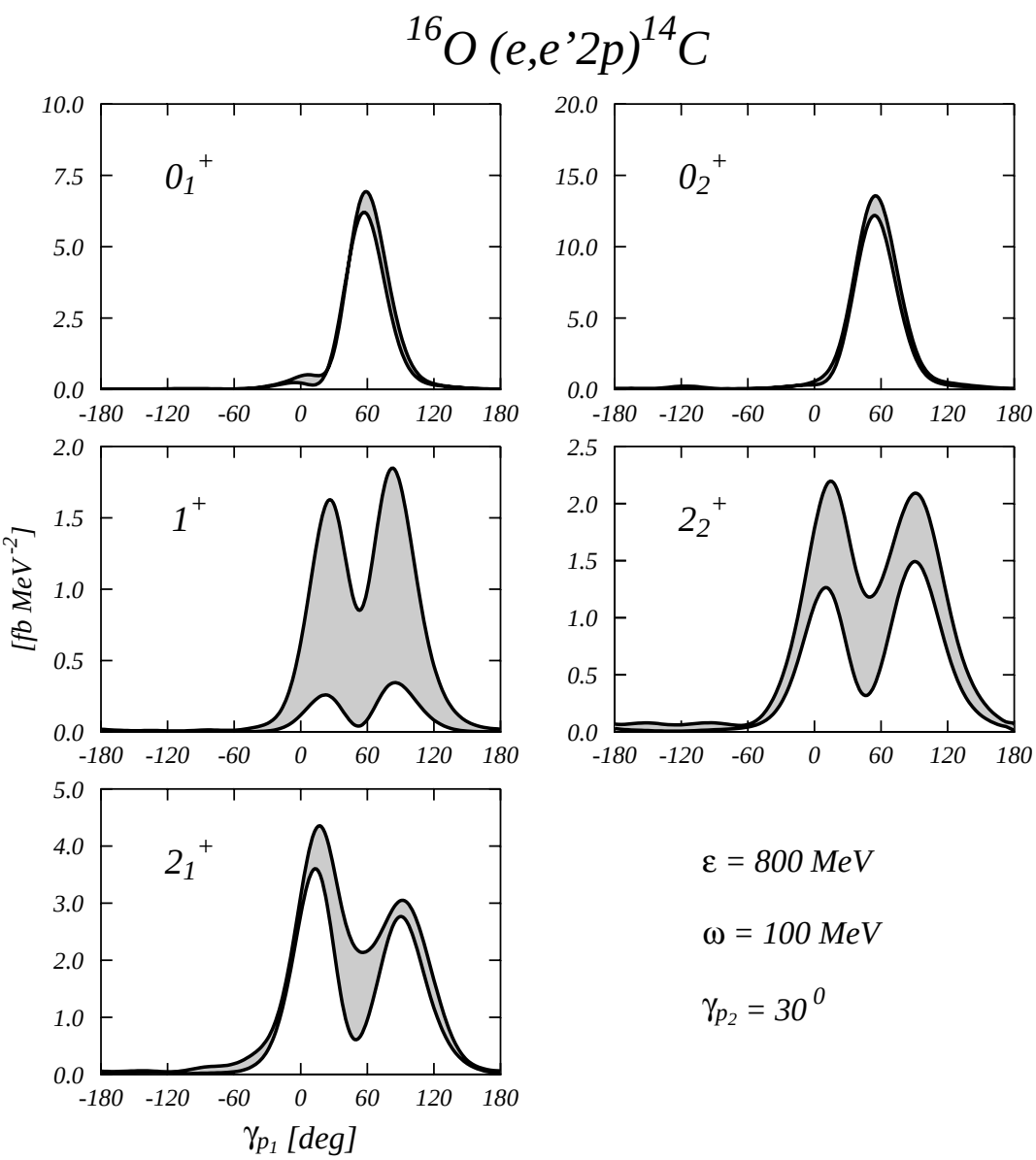
(3.5) *(3.6)* *(3.7)* *(3.8)*

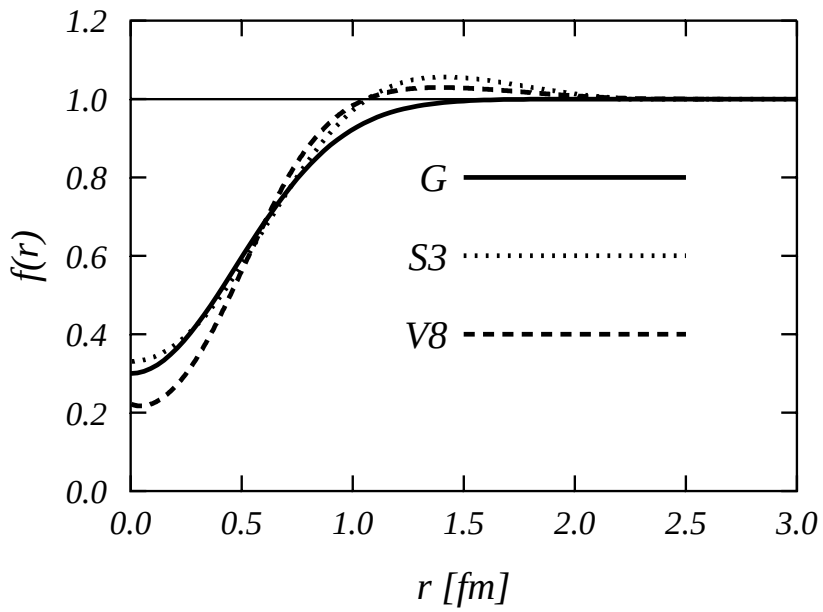

$^{16}O\ (e,e'2p)^{14}C$
$^{40}Ca\ (e,e'2p)^{38}Ar$
0_1^+
2_1^+
1^+
[fb MeV^{-2}]
γ_{p_1} [deg]
-180 -120 -60 0 60 120 180

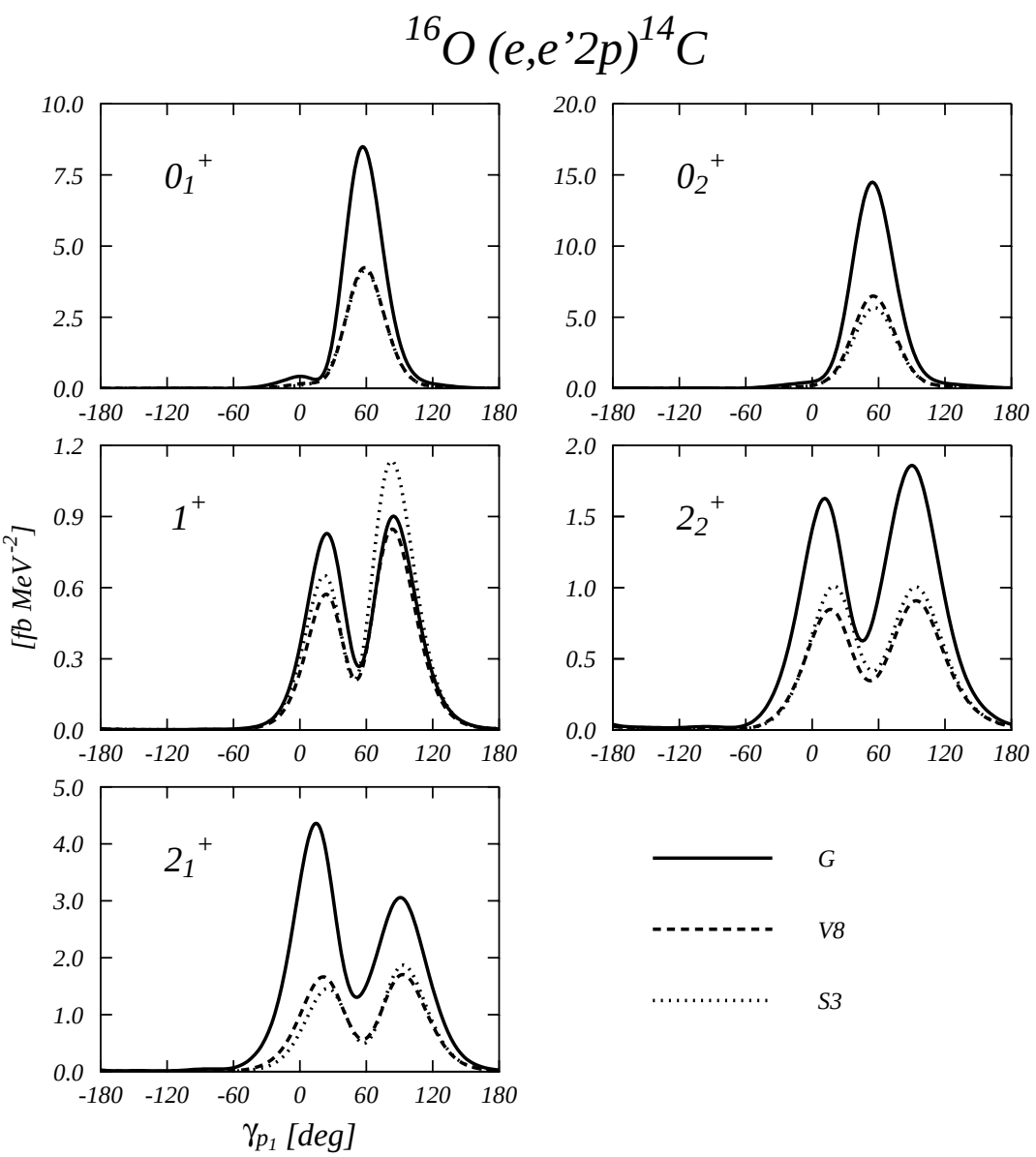

π^o
Δ
Δ
π^o
A
B

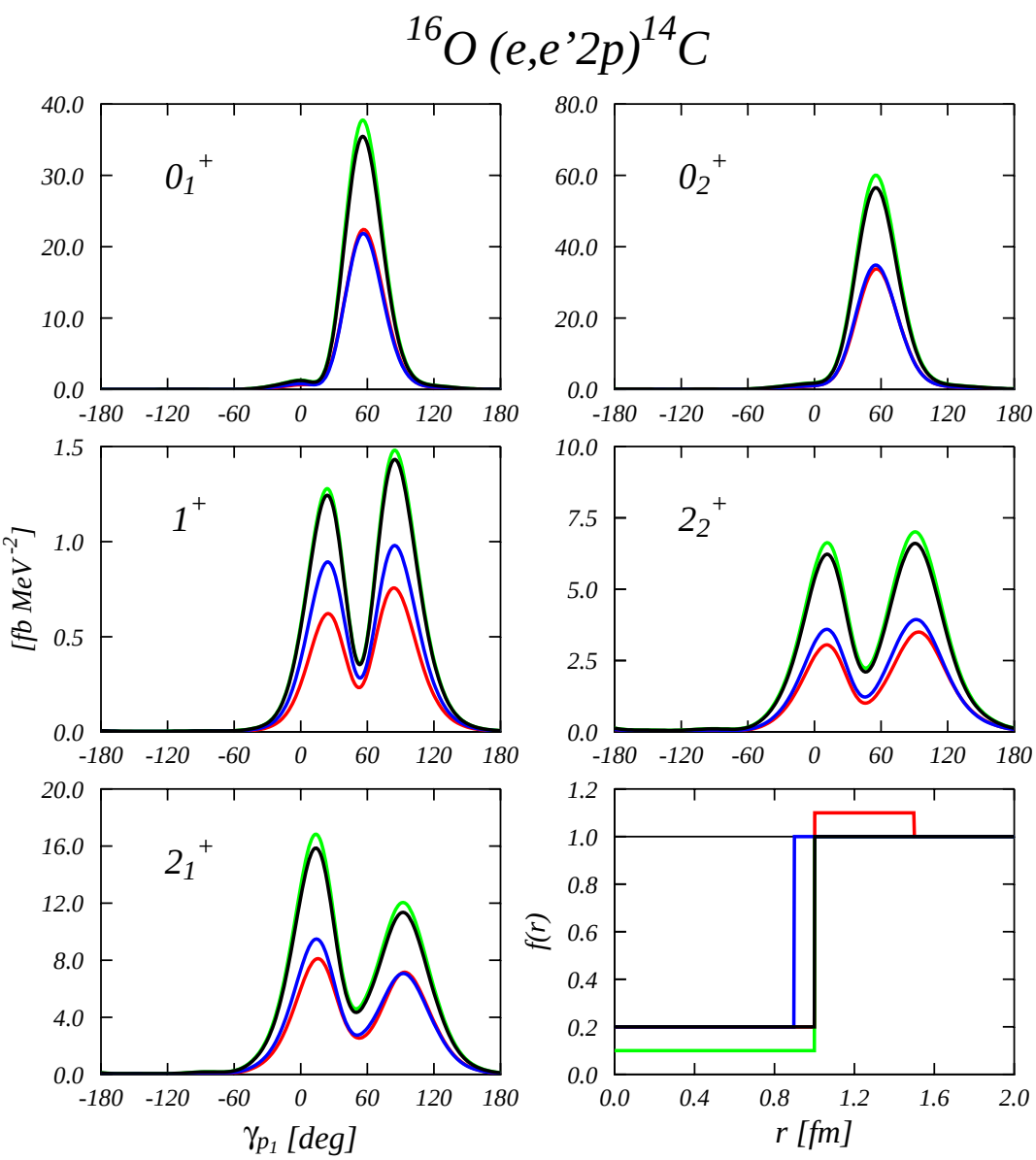
$^{16}O(e,e'2p)^{14}C$




$^{16}O\ (e,e'2p)^{14}C$
0_1^+
0_2^+
1^+
2_2^+
2_1^+
[fb MeV^{-2}]
γ_{p_1} [deg]
ε = 800 MeV
ω = 100 MeV
$\gamma_{p_2} = 30^0$


1.2
1.0
0.8
0.6
0.4
0.2
0.0
f(r)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
r [fm]
G
S3
V8


$^{16}O\ (e,e'2p)^{14}C$
0_1^+
0_2^+
1^+
2_2^+
2_1^+
[fb MeV^{-2}]
γ_{p_1} [deg]
G
V8
S3


$^{16}O\ (e,e'2p)^{14}C$
0_1^+
0_2^+
1^+
2_2^+
2_1^+
[fb MeV^{-2}]
γ_{p_1} [deg]
f(r)
r [fm]