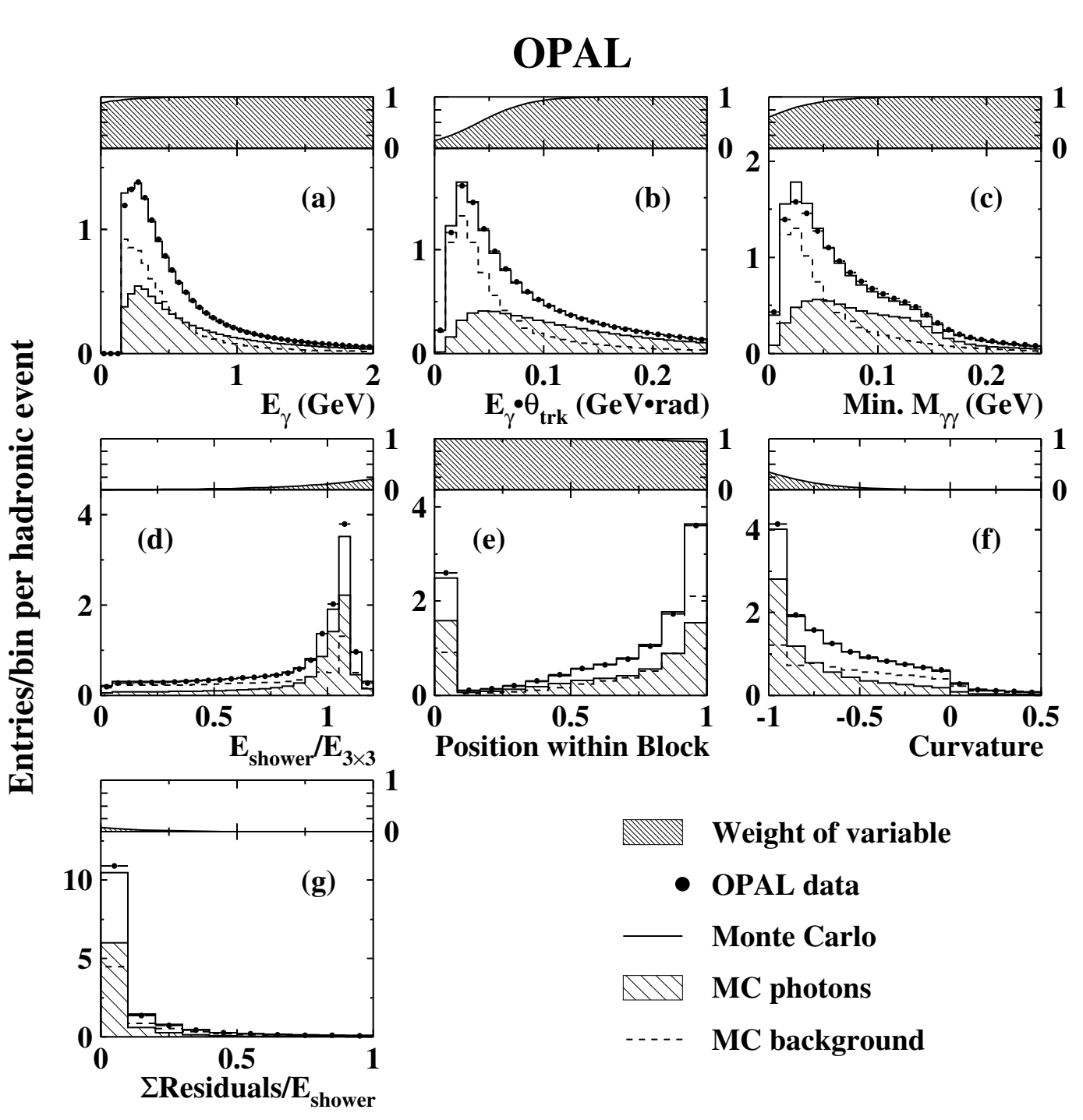
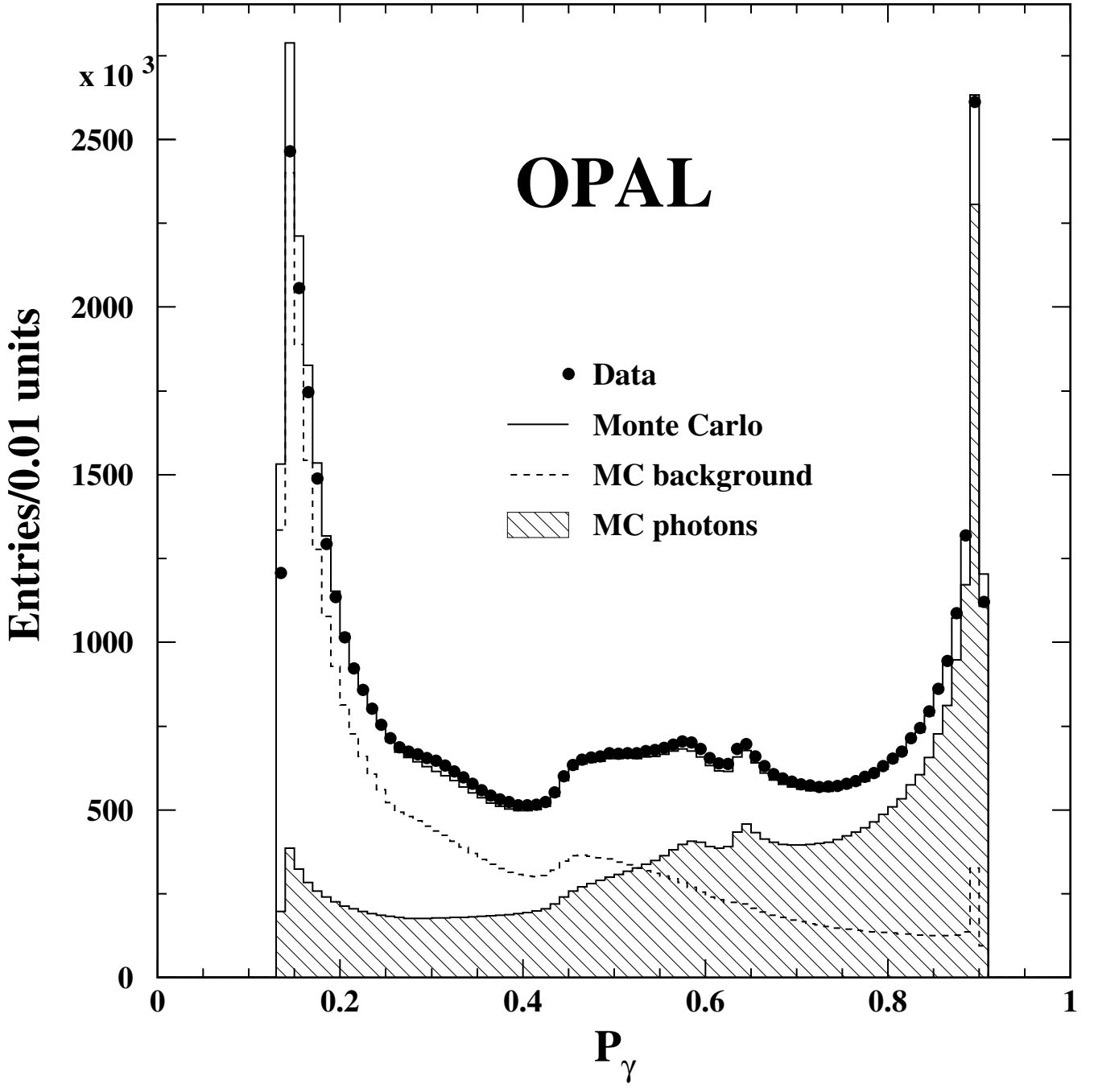
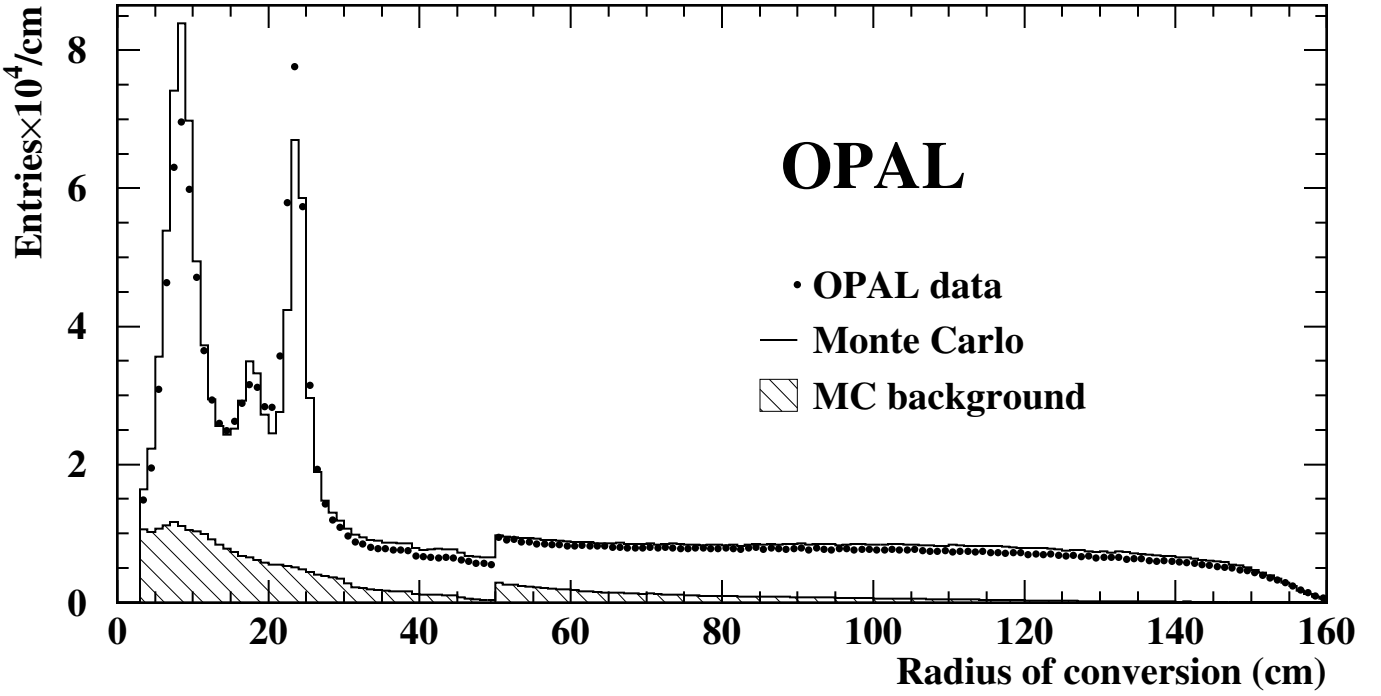
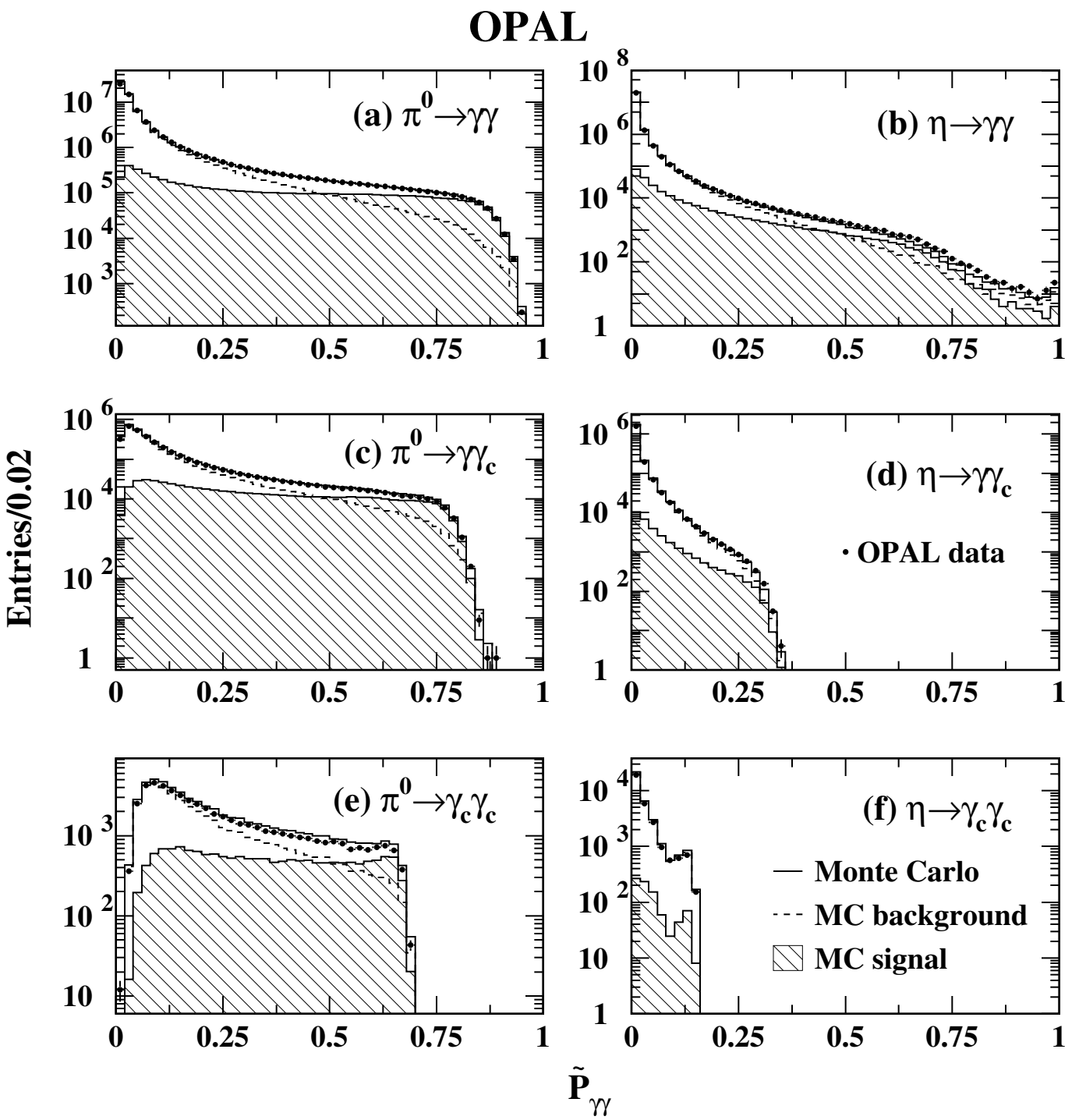
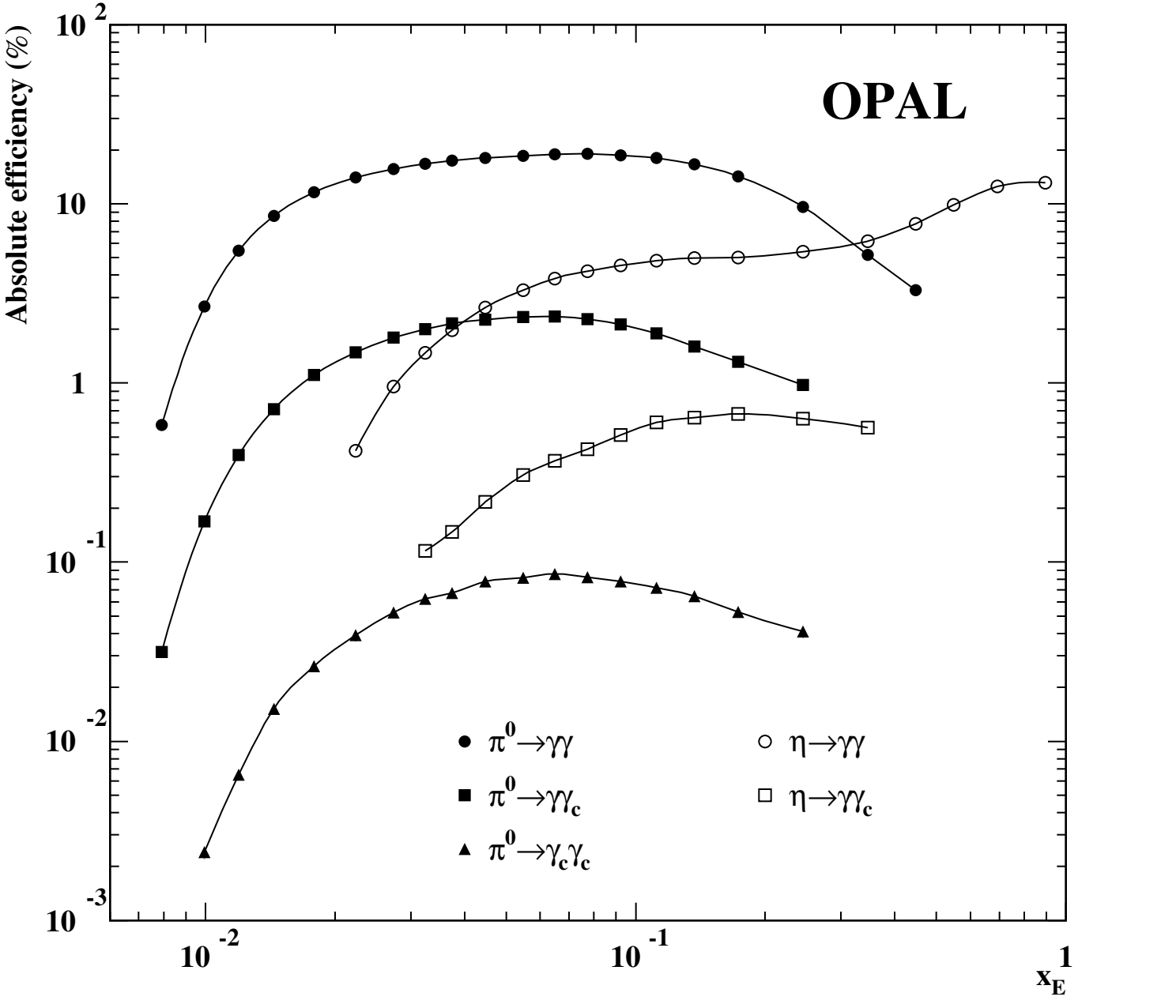
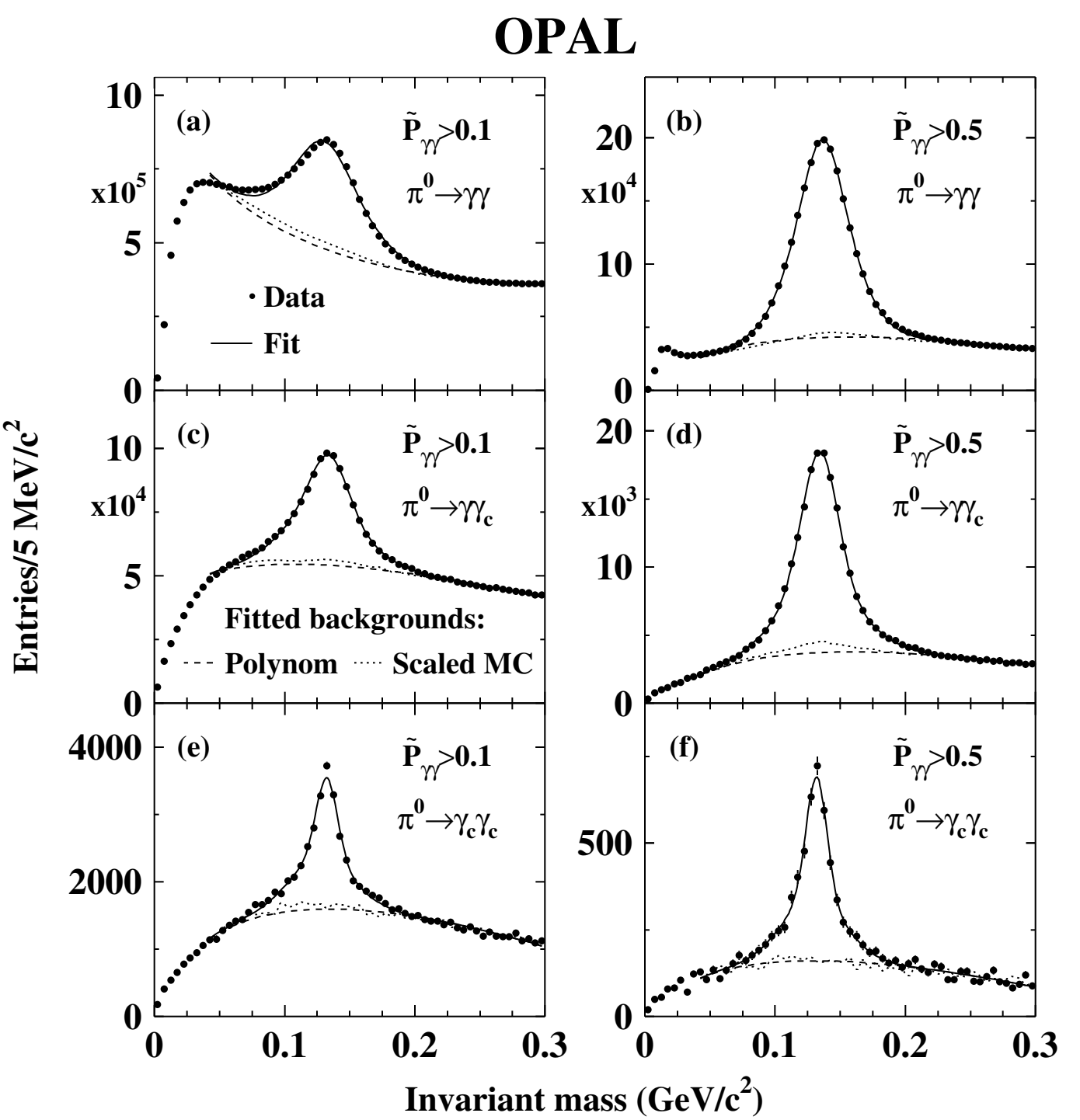

OPAL
Entries/bin per hadronic event
(a)
(b)
(c)
(d)
(e)
(f)
(g)
E_γ (GeV)
$E_\gamma \bullet \theta_{trk}$ (GeV•rad)
Min. $M_{\gamma\gamma}$ (GeV)
$E_{shower}/E_{3\times3}$
Position within Block
Curvature
ΣResiduals/E_{shower}
Weight of variable
OPAL data
Monte Carlo
MC photons
MC background

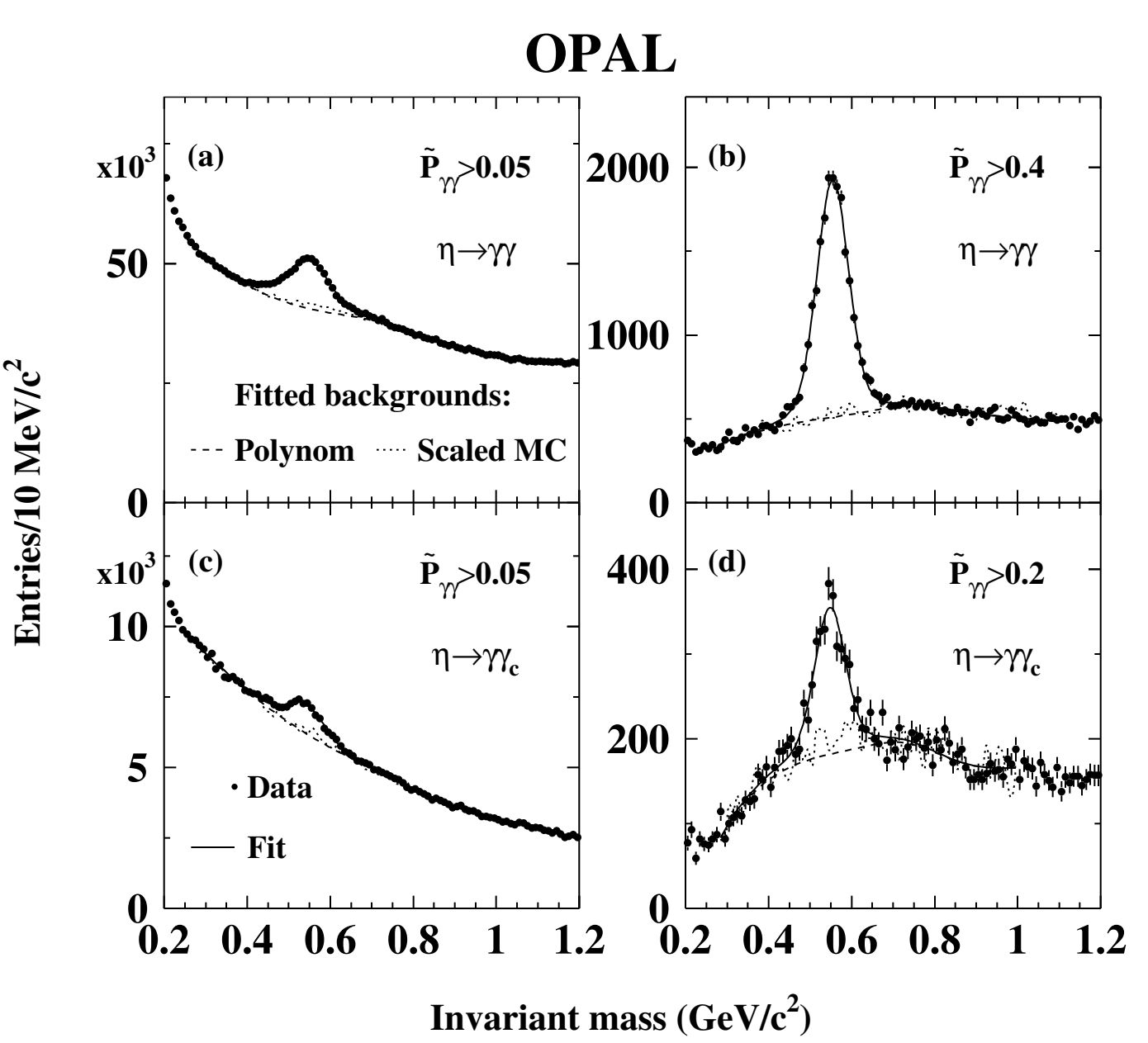

OPAL
x 10 3
2500
2000
1500
1000
500
0
Entries/0.01 units
Data
Monte Carlo
MC background
MC photons
0
0.2
0.4
0.6
0.8
1
P γ

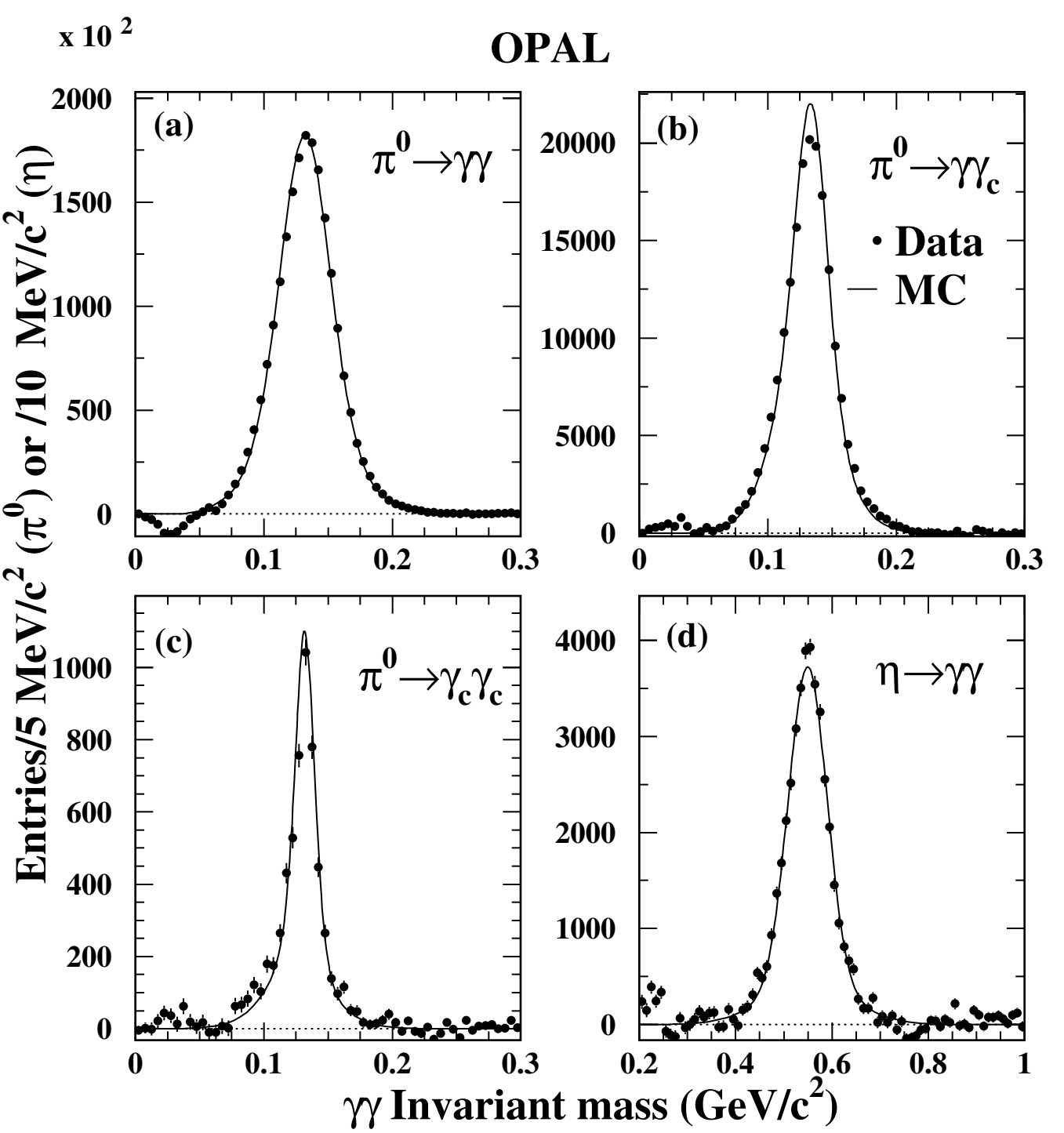

OPAL
OPAL data
Monte Carlo
MC background
Entries×10^4/cm
Radius of conversion (cm)
0
2
4
6
8
0
20
40
60
80
100
120
140
160

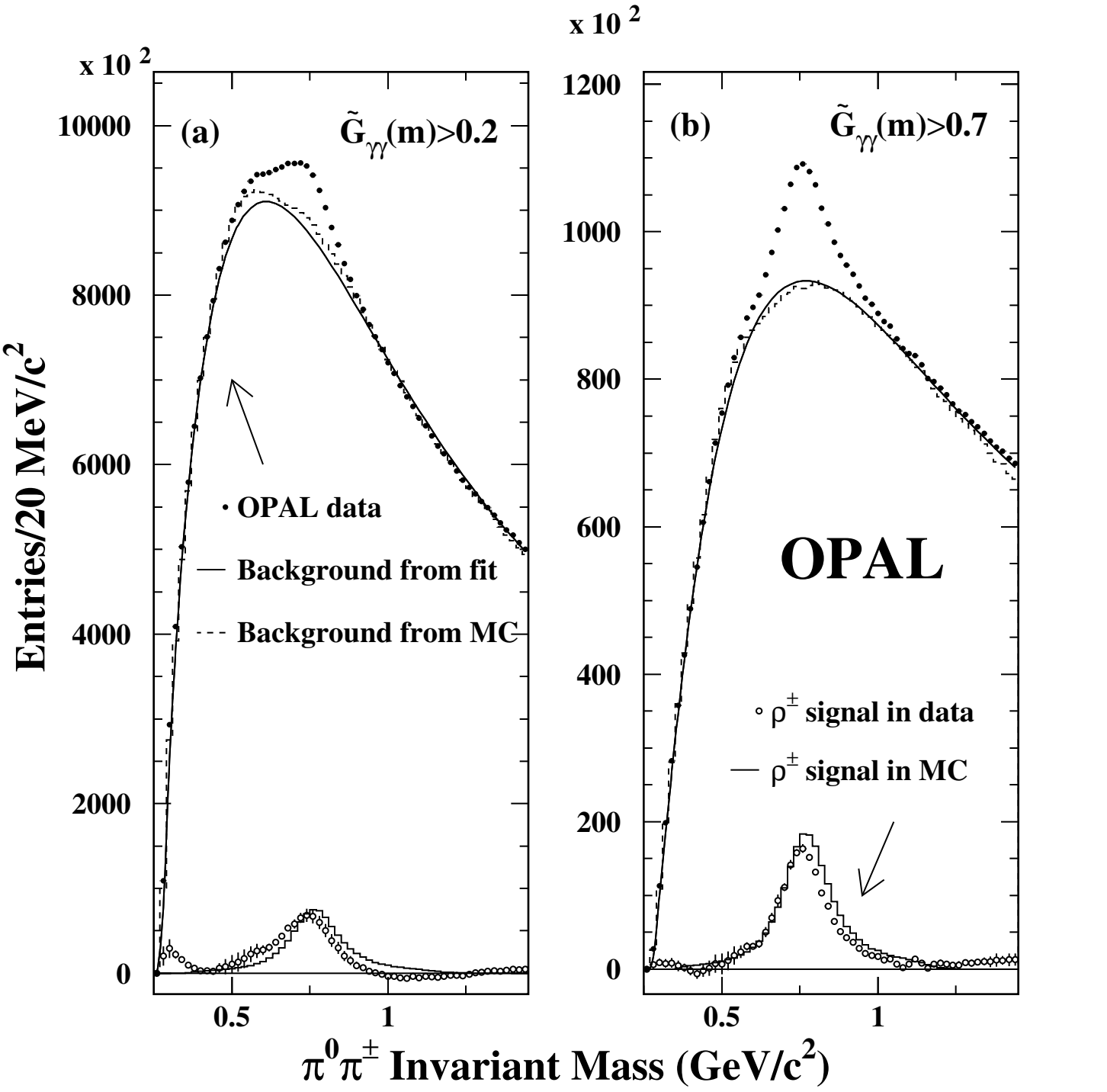

OPAL
(a) $\pi^0 \to \gamma\gamma$
(b) $\eta \to \gamma\gamma$
(c) $\pi^0 \to \gamma\gamma_c$
(d) $\eta \to \gamma\gamma_c$
• OPAL data
(e) $\pi^0 \to \gamma_c\gamma_c$
(f) $\eta \to \gamma_c\gamma_c$
Monte Carlo
MC background
MC signal
Entries/0.02
$\tilde{P}_{\gamma\gamma}$

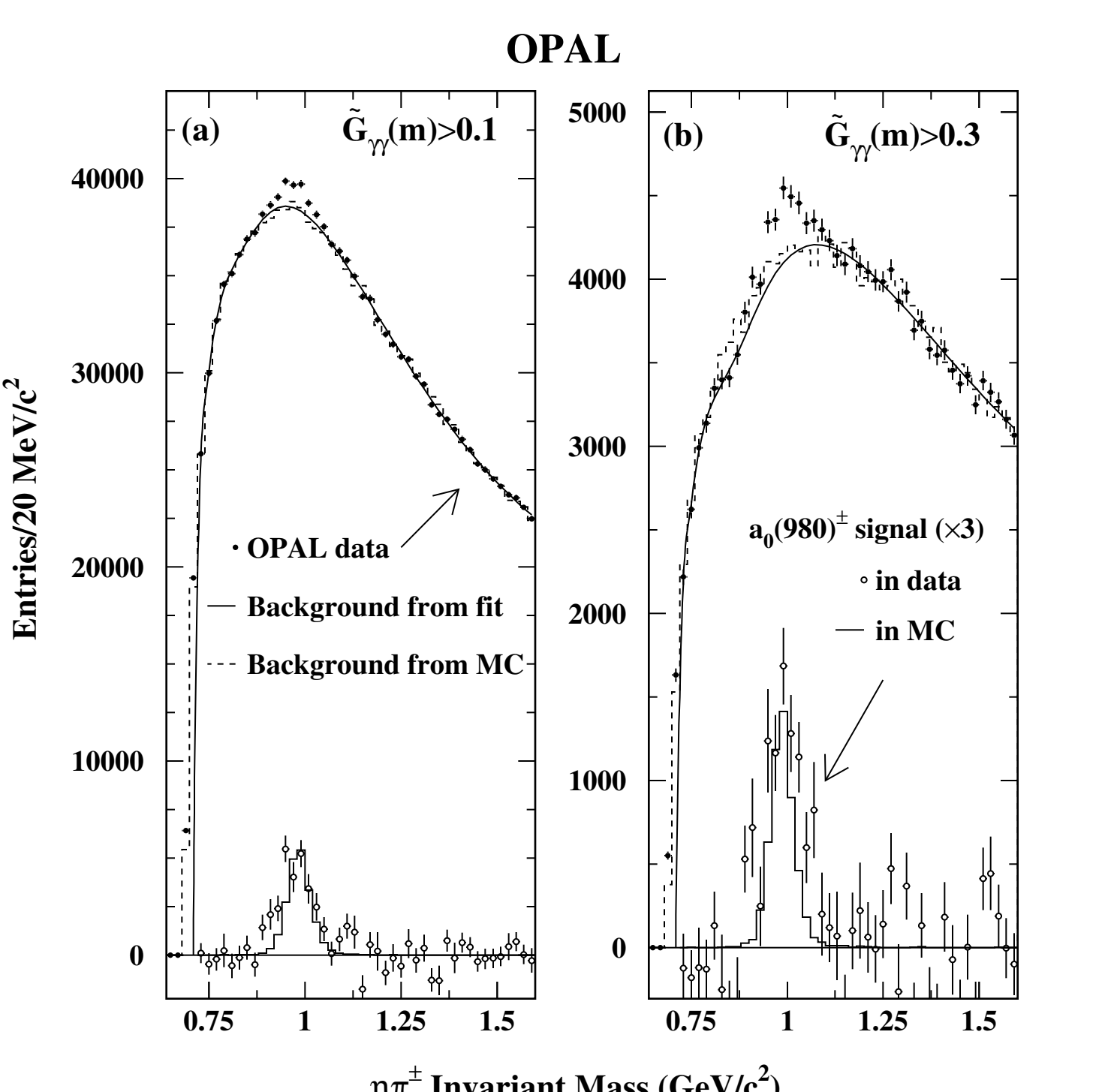

OPAL
Absolute efficiency (%)
10^{2}
10
1
10^{-1}
10^{-2}
10^{-3}
10^{-2}
10^{-1}
1
x_E
$\pi^0 \to \gamma\gamma$
$\pi^0 \to \gamma\gamma_c$
$\pi^0 \to \gamma_c\gamma_c$
$\eta \to \gamma\gamma$
$\eta \to \gamma\gamma_c$

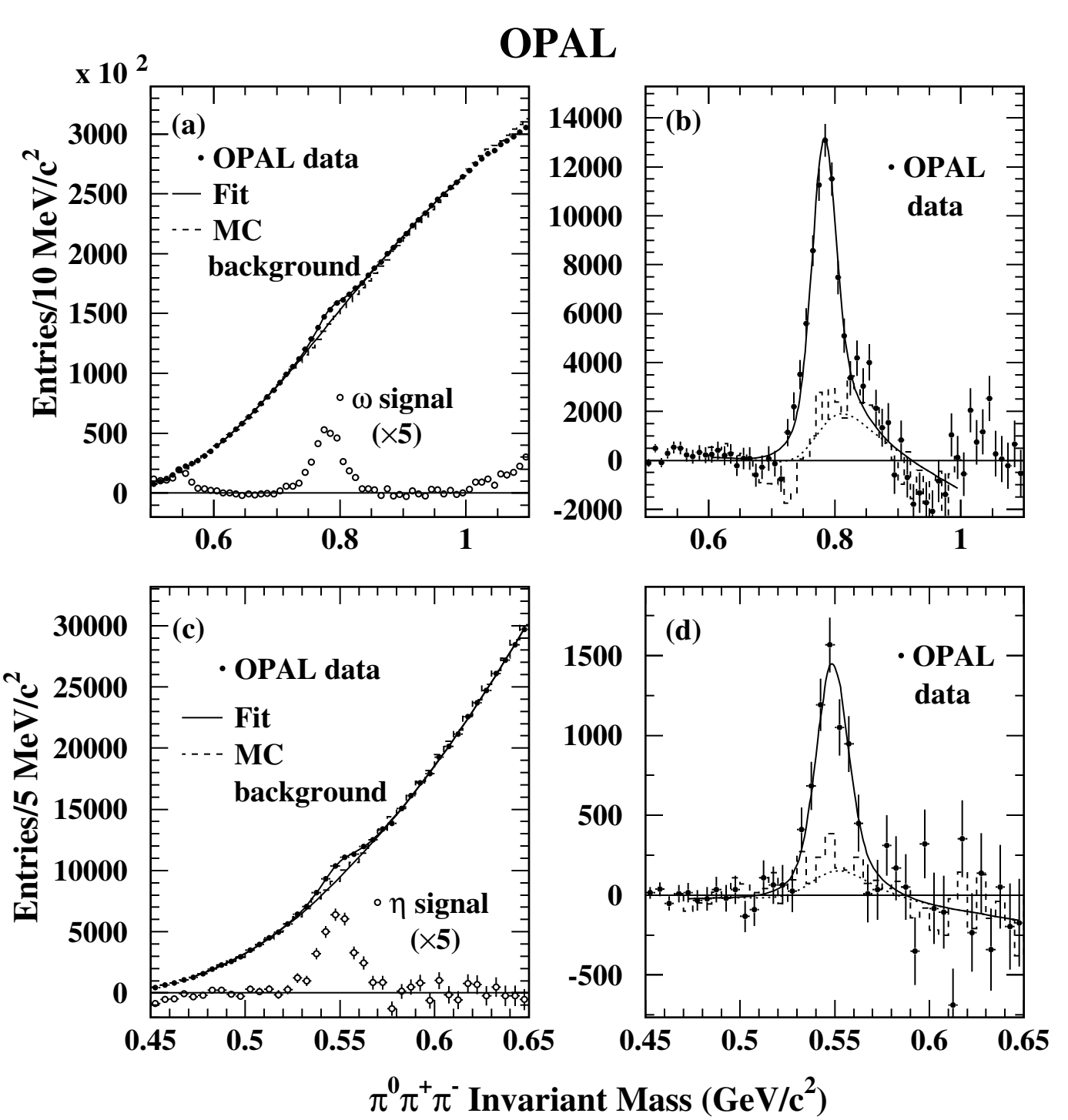

OPAL
(a)
$\tilde{P}_{\gamma\gamma}$>0.1
$\pi^0\to\gamma\gamma$
x10^5
Data
Fit
(b)
$\tilde{P}_{\gamma\gamma}$>0.5
$\pi^0\to\gamma\gamma$
x10^4
(c)
$\tilde{P}_{\gamma\gamma}$>0.1
$\pi^0\to\gamma\gamma_c$
x10^4
Fitted backgrounds:
Polynom
Scaled MC
(d)
$\tilde{P}_{\gamma\gamma}$>0.5
$\pi^0\to\gamma\gamma_c$
x10^3
(e)
$\tilde{P}_{\gamma\gamma}$>0.1
$\pi^0\to\gamma_c\gamma_c$
(f)
$\tilde{P}_{\gamma\gamma}$>0.5
$\pi^0\to\gamma_c\gamma_c$
Entries/5 MeV/c^2
Invariant mass (GeV/c^2)

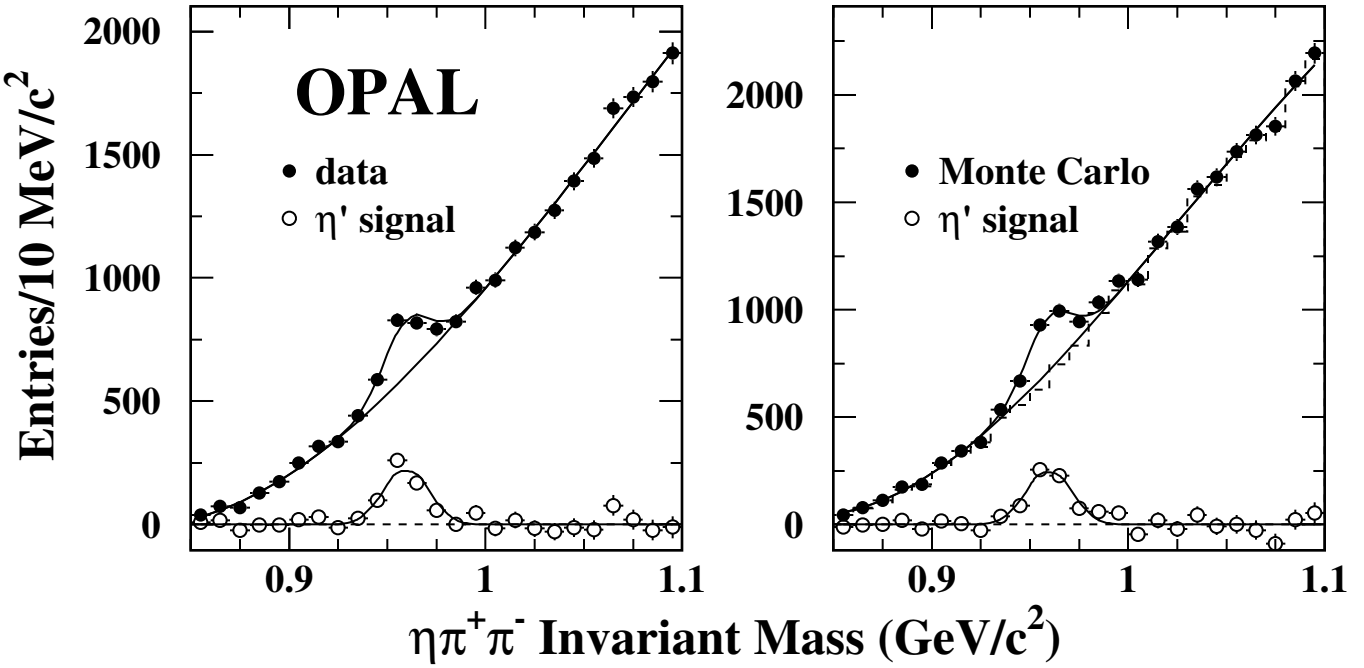

OPAL
(a)
$\tilde{P}_{\gamma\gamma}$>0.05
η→γγ
x10^3
50
0
Fitted backgrounds:
Polynom
Scaled MC
(b)
$\tilde{P}_{\gamma\gamma}$>0.4
η→γγ
2000
1000
0
(c)
$\tilde{P}_{\gamma\gamma}$>0.05
η→γγ$_c$
x10^3
10
5
0
Data
Fit
(d)
$\tilde{P}_{\gamma\gamma}$>0.2
η→γγ$_c$
400
200
0
0.2
0.4
0.6
0.8
1
1.2
Entries/10 MeV/c^2
Invariant mass (GeV/c^2)


x 10 2
OPAL
(a)
$\pi^0 \to \gamma\gamma$
(b)
$\pi^0 \to \gamma\gamma_c$
• Data
— MC
(c)
$\pi^0 \to \gamma_c\gamma_c$
(d)
$\eta \to \gamma\gamma$
Entries/5 MeV/c^2 (π^0) or /10 MeV/c^2 (η)
$\gamma\gamma$ Invariant mass (GeV/c^2)

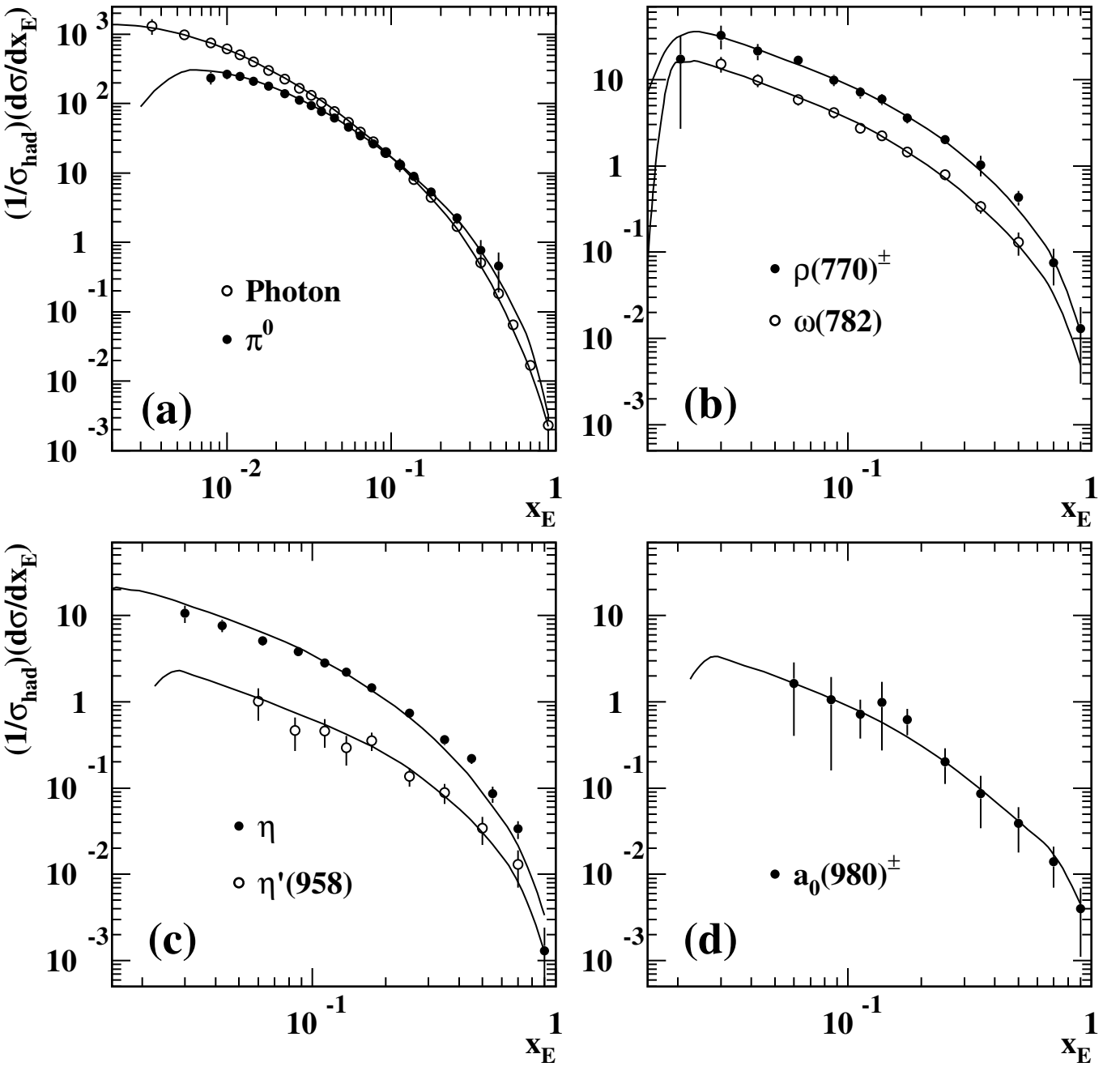

x 10 2
10000
8000
6000
4000
2000
0
(a)
$\tilde{G}_{\gamma\gamma}(m)>0.2$
• OPAL data
— Background from fit
--- Background from MC
x 10 2
1200
1000
800
600
400
200
0
(b)
$\tilde{G}_{\gamma\gamma}(m)>0.7$
OPAL
∘ $\rho^{\pm}$ signal in data
— $\rho^{\pm}$ signal in MC
0.5
1
0.5
1
Entries/20 MeV/c^2
$\pi^0\pi^{\pm}$ Invariant Mass (GeV/c^2)

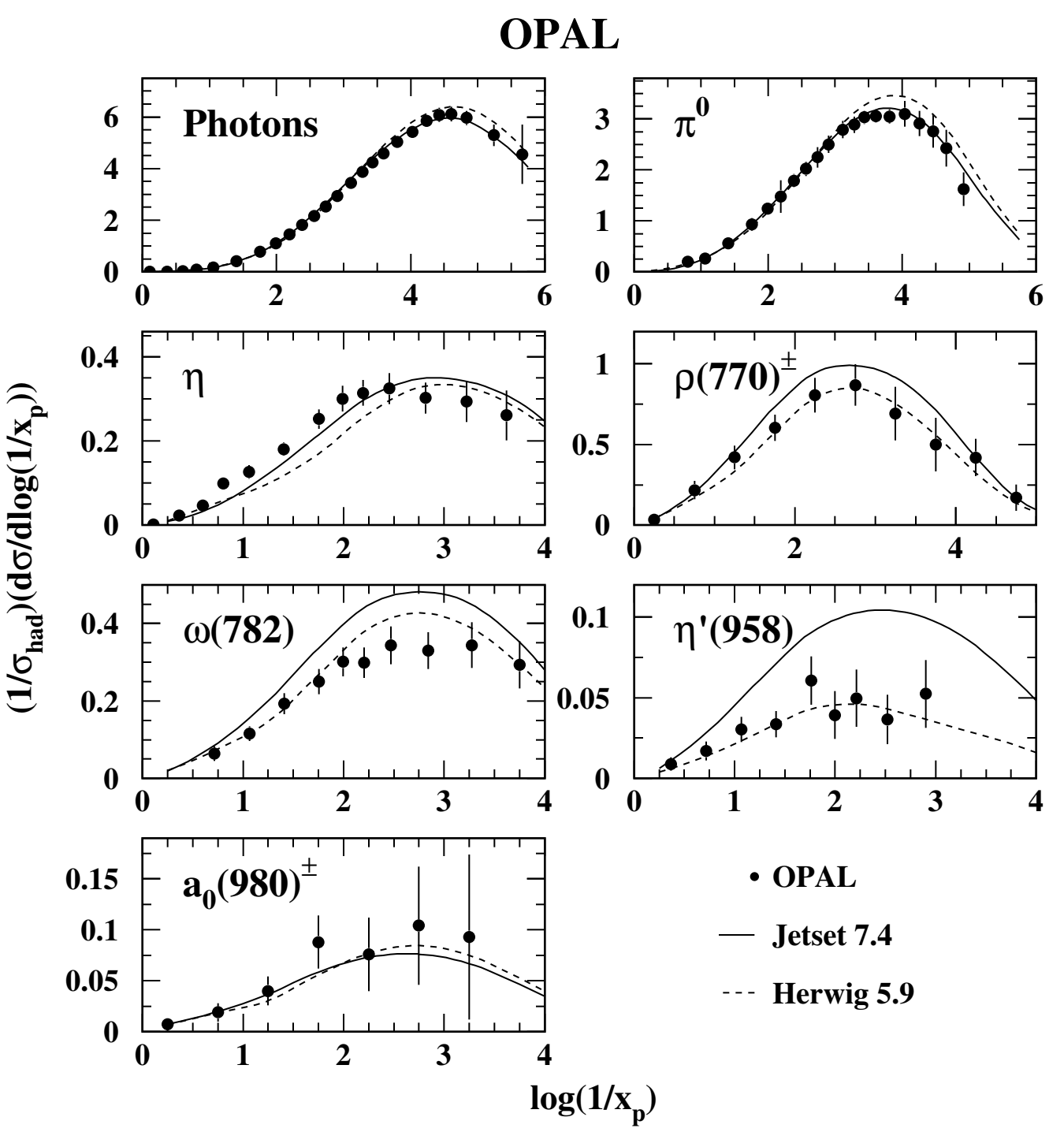

OPAL
(a)
$\tilde{G}_{\gamma\gamma}(m)>0.1$
(b)
$\tilde{G}_{\gamma\gamma}(m)>0.3$
Entries/20 MeV/c^2
$\eta\pi^{\pm}$ Invariant Mass (GeV/c^2)
OPAL data
Background from fit
Background from MC
$a_0(980)^{\pm}$ signal (×3)
in data
in MC
40000
30000
20000
10000
0
5000
4000
3000
2000
1000
0.75
1
1.25
1.5

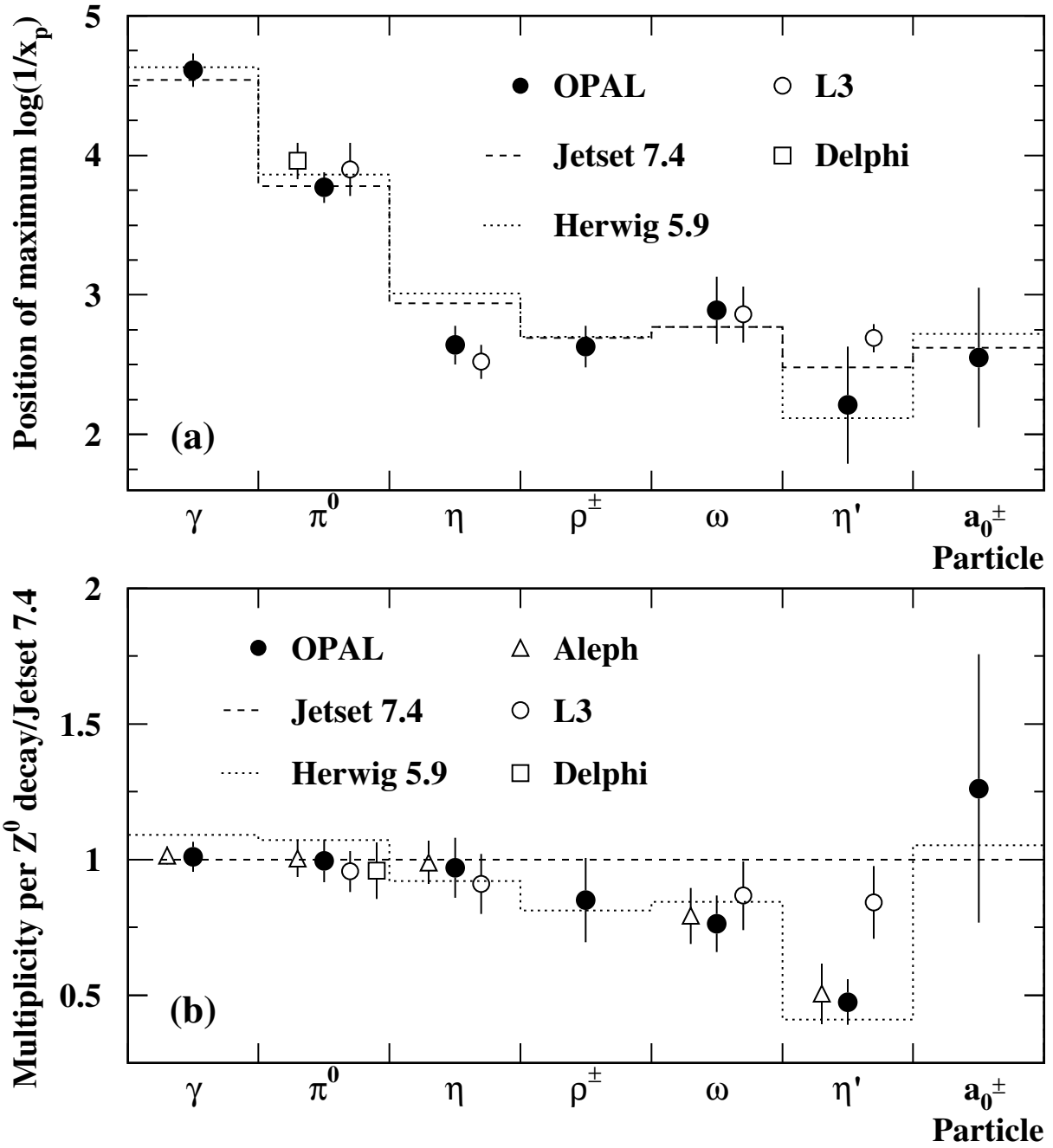

OPAL
x 10 2
(a)
• OPAL data
Fit
MC background
◦ ω signal (×5)
Entries/10 MeV/c2
(b)
• OPAL data
(c)
• OPAL data
Fit
MC background
◦ η signal (×5)
Entries/5 MeV/c2
(d)
• OPAL data
π0π+π- Invariant Mass (GeV/c2)


OPAL
• data
○ η' signal
• Monte Carlo
○ η' signal
Entries/10 MeV/c^2
ηπ$^+$π$^-$ Invariant Mass (GeV/c^2)
0
500
1000
1500
2000
0.9
1
1.1

OPAL




OPAL
Photons
π^0
η
$\rho(770)^{\pm}$
$\omega(782)$
$\eta'(958)$
$a_0(980)^{\pm}$
• OPAL
Jetset 7.4
Herwig 5.9
$(1/\sigma_{had})(d\sigma/d\log(1/x_p))$
$\log(1/x_p)$


Position of maximum log(1/x_p)
OPAL
L3
Jetset 7.4
Delphi
Herwig 5.9
(a)
γ
π0
η
ρ±
ω
η'
a0±
Particle
Multiplicity per Z0 decay/Jetset 7.4
OPAL
Aleph
Jetset 7.4
L3
Herwig 5.9
Delphi
(b)
γ
π0
η
ρ±
ω
η'
a0±
Particle