

CROSS SECTION COMPARISON

Report from Φ -decay WG Meeting 26/04/02

(1) $\phi \rightarrow \eta \gamma$

[S. GIOVANNELLA, S. MISCIETTI]

$$\begin{array}{l} \text{---} \rightarrow \gamma \gamma \\ \text{---} \rightarrow \pi^0 \pi^0 \pi^0 \end{array}$$

(2) $\phi \rightarrow \eta \gamma$

[F. AMBROSINO]

$$\text{---} \rightarrow \pi^+ \pi^- \pi^0$$

(3) $\phi \rightarrow \pi^+ \pi^- \pi^0$

[C. BINI]

(4) $\phi \rightarrow K_S K_L$

[M. PALUTAN, T. SPADARO,
P. VALENTE]

$$\begin{array}{l} \text{---} \rightarrow \text{crash} \\ \text{---} \rightarrow \text{"everything"} \end{array}$$

(+) CONSISTENCY CHECK ■ GIVEN PDG BRs

- Report from single measurements
- General comments
- Consistency

GENERAL COMMENTS

→ $\sqrt{s}$ dependence

Figure →

→ Corrections to MC

+ Accidentals { ACCELE
MBCKADD

ok [to include on trigger]
not yet

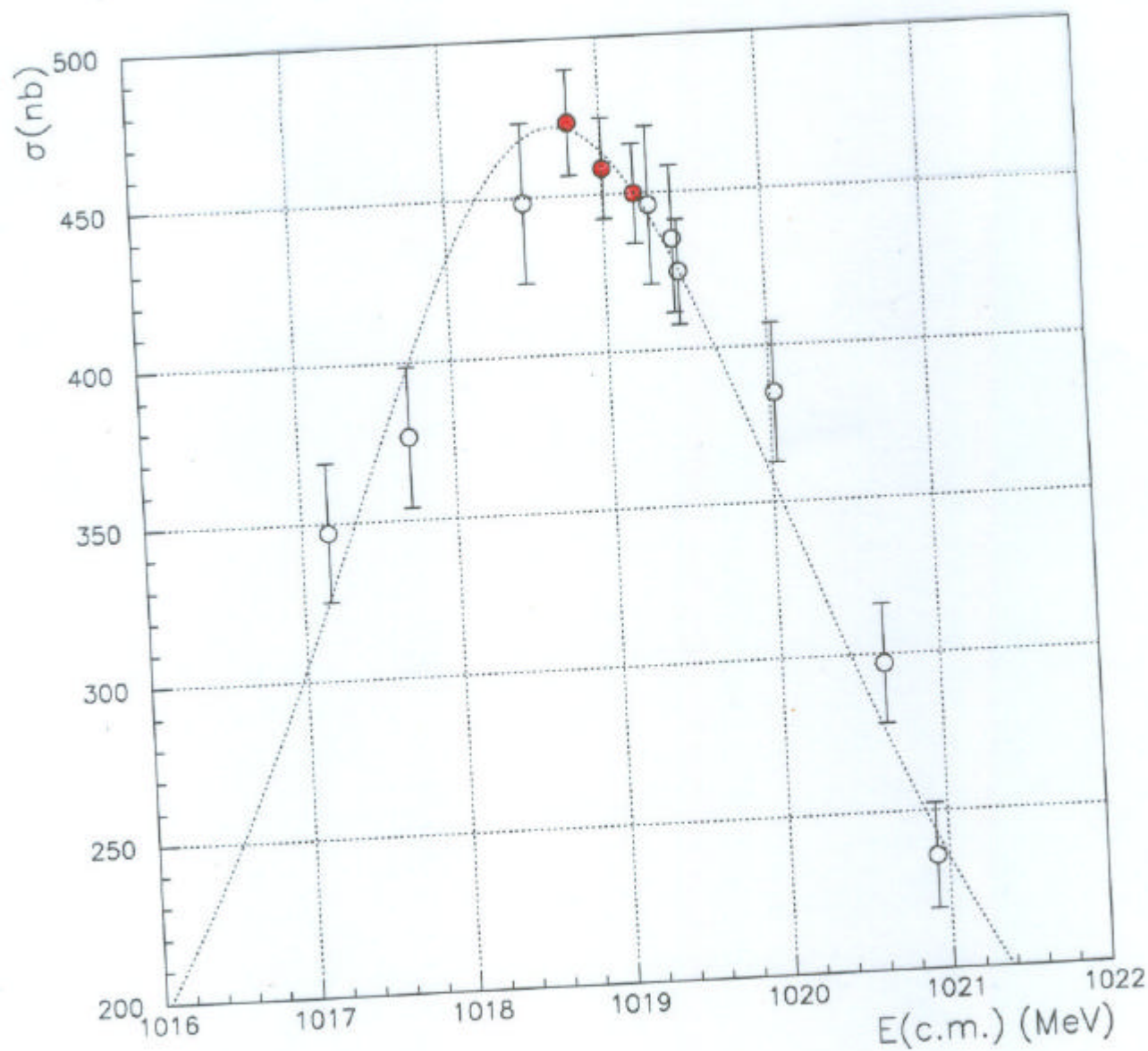
+ eff. $\frac{\text{data}}{\text{MC}}$ { PHOTON E_γ
TRACKING
VERTEX

} different approaches
⇒ need of "convergence"

{ FILFO
VETO COSM.
TRIGGER

[~2% discrepancy $\frac{\text{data}}{\text{MC}}$ observed]
ok
only check

FIG. 10



SUMMARY

channel	σ_{KLOE} (nb)	BR_1 (PDG)	BR_2 (PDG)
$\phi \rightarrow K_S K_L$ $\quad \quad \quad \hookrightarrow \text{crash}$ $\quad \quad \quad \hookrightarrow \text{everything}$	$976 \pm 3 \pm 13$	0.336 ± 0.006	✓
$\phi \rightarrow \pi^+ \pi^- \pi^0$	$470 \pm 1 \pm 12$	0.155 ± 0.006	✓
$\phi \rightarrow \eta \gamma$ $\quad \quad \quad \hookrightarrow \gamma \gamma$	$17.07 \pm 0.05 \pm 0.15$ (1.298 ± 0.029)%	0.3933 ± 0.0025	
$\phi \rightarrow \eta \gamma$ $\quad \quad \quad \hookrightarrow 3\pi^0$	$13.82 \pm 0.05 \pm 0.30$	0.3224 ± 0.0029	
$\phi \rightarrow \eta \gamma$ $\quad \quad \quad \hookrightarrow \pi^+ \pi^- \pi^0$	$9.19 \pm 0.04 \pm 0.37$	0.230 ± 0.004	



$$\sigma_{KLOE} \Rightarrow \sigma_\phi = \sigma_{KLOE} / BR_1 * BR_2 \quad \longrightarrow$$

(1) CONSISTENCY CHECK

$$\chi^2 = \sum_i \frac{(\sigma_{KLOE} - \sigma_\phi \cdot BR_1 \cdot BR_2)^2}{\sigma^2(\sigma_{KLOE})^2 + \sigma^2(\sigma_\phi)^2} = 21 \quad / \quad 4 \text{ dof}$$

$$\Rightarrow P \sim 4 \times 10^{-4}$$

but neglected correlations

between BR_1 's and BR_2 's [-30% between $K_S K_L$ and $\pi^+ \pi^- \pi^0$]
 [-74% / -79% $\eta \rightarrow \pi^+ \pi^- \pi^0$ with $0K_S$]

(2) $\sigma_\phi = 3127$ nb [weighted average] fixed

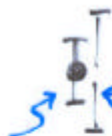
$$BR(\phi \rightarrow K_S K_L) = PDG * (0.93 \pm 0.02)$$

$$BR(\phi \rightarrow \pi^+ \pi^- \pi^0) = PDG * (0.97 \pm 0.04)$$

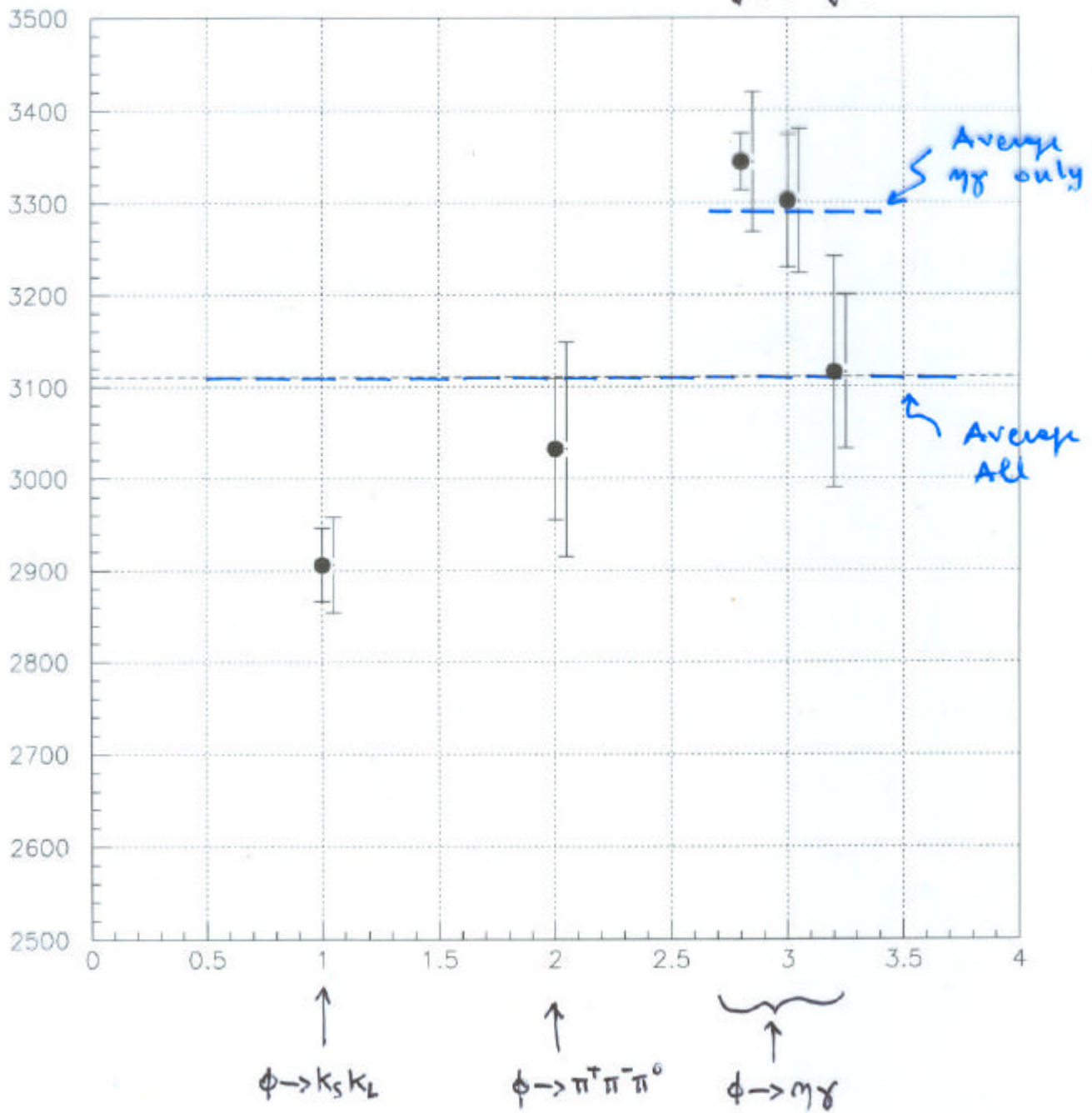
$$BR(\phi \rightarrow \eta \gamma) = PDG * (1.05 \pm 0.01)$$

CROSS SECTION COMPARISON : SUMMARY

FOR EVERY POINT

exp. uncert.  BR uncert.

$\eta \rightarrow \gamma\gamma$
 $\eta \rightarrow 3\pi^0$
 $\eta \rightarrow \pi^+\pi^-\pi^0$



(3) The $\eta\gamma$ are compatible among them

$$\chi^2 = 1.75 / 2 \text{ dof} \Rightarrow P = \text{"good"}$$

they look more similar to new results not included in PDG:

	KLOE	PDG	recent result
$\frac{BR(\pi^0\pi^0\pi^0)}{BR(\gamma\gamma)}$	0.810 ±0.009 ±0.011	0.820 ±0.007	
$\frac{BR(\pi^0\pi^0\pi^0)}{BR(\pi^+\pi^-\pi^0)}$	1.504 ±0.063	1.404 ±0.034	1.52 (CMD-2) ±0.04 (2001) ±0.08
$\frac{BR(\pi^+\pi^-\pi^0)}{BR(\gamma\gamma) + BR(\pi^0\pi^0\pi^0)}$	0.298 ±0.013	0.321 ±0.007	0.309 (SND) ±0.012

CONCLUSION

→ discrepancy between $K_S K_L$ and $\eta\gamma$
($\pi^+\pi^-\pi^0$ close to the average)

→ Systematics KLOE

→ PDG BR's Systematics

→ $\phi \rightarrow K^+ K^-$ welcome [half ϕ missing]

→ σ_ϕ depends on Beam Energy Spread

→ $\phi \rightarrow K_S K_L$
 $\begin{matrix} \searrow & \rightarrow & \text{crash} \\ \searrow & \rightarrow & \pi^+\pi^- \end{matrix}$

$\sqrt{s}(\vec{p}_{K_L}^*)$ vs. $\sqrt{s}(\vec{p}_{K_S})$ event by event

⇒ ANALYSIS OF ENERGY SCAN HELPS